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THE OPHTHALMO-REACTION IN TYPHOID FEVER.

By Charles R. Austrian, M. D.

Director of the Research Laboratory of the Phipps Dispensary for Tuberculosis; Assistant in Medicine, The Johns Hopkins University.

(From the Medical Clinic of the Johns Hopkins Hospital.)

When Calmette published his article on the ophthalmo-reaction in tuberculosis, clinicians welcomed the method as a valuable diagnostic aid and subsequent studies have shown that the welcome given it was no more hearty than it merited. The possibility of employing a like procedure in the diagnosis of other diseases was at once apparent. In typhoid fever, for instance, it was readily appreciated that if an eye test which was reliable could be devised, it would offer the advantages of being a bedside test, made and interpreted by the physician and unattended by discomfort to the patient.

Chantemesse[1] was the first to realize these facts, and in 1907 he described an "Ophthalmo-diagnostic" for typhoid fever. The method he employed was as follows: The twenty-hour growth of virulent typhoid bacilli on gelatin plates was washed down with four or five cubic centimeters of sterile distilled water, and heated at 60° centigrade. The suspension was centrifuged, the supernatant fluid decanted, and the sedimented bacilli dried in vacuo. The dried residue was then ground with sodium chloride crystals, in an agate mortar, for two or three hours; sterile water was added, drop by drop, in the proportion of ten grams of water to each three grams of bacilli, and the resulting emulsion heated at 60° centigrade for two hours. After warming, the solid particles were allowed to settle for three days, heating occasionally for half an hour at 60° centigrade, after which the supernatant fluid was poured into ten volumes of absolute alcohol, and the white coagulum which formed was dried in vacuo. Ten milligrams of the pulverized precipitate was then dissolved in one cubic centimeter of distilled water, and one drop of this solution was used for each test. Chantemesse obtained positive reactions in all of the seventy cases of typhoid fever examined, and negative reactions in forty-nine of fifty control cases. The one control case which reacted was a tuberculous individual "who probably had the disease two years before." The typical reaction appeared within two or three hours as a reddening of the conjunctiva which rapidly spread to the caruncle, followed after a short interval by the appearance of lacrimation and a fibrinous exudate. He emphasized the fact that injection of the conjunctiva and of the caruncle was still evident twenty-four hours after it appeared, and occasionally persisted as long as six days; that the response was more marked in patients ill with typhoid fever and in convalescents from the disease, than it was in normal persons or in persons ill with other diseases; and that in no instance did dangerous local symptoms develop.

Several months after the publication of Chantemesse's article, Kraus, Lusenberger and Russ[2] observed that the method offered difficulties, since the efficacy of the test preparation is dependent on the toxicity of the bacilli, and that therefore the results of different observers are comparable

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only when a toxin of uniform determined strength is used. They made an elaborate series of observations with various extracts of typhoid, paratyphoid and colon bacilli, and with tuberculin, and found that all of these caused slight inflammatory changes in the conjunctivæ of healthy persons, of patients ill with typhoid fever or suffering from other diseases, and concluded that, inasmuch as the reaction is not specific, it is of no value.

The work of these observers, however, is subject to criticism, first, because they used test solutions prepared according to a different technic than that recommended by Chantemesse; second, because in making the test they used only one-tenth the amount recommended by him; and third, because they failed to regard the persistence of the reaction in interpreting their results.

In the following year, Prevel [3] published the results of the ophthalmo-reaction in five hundred cases of typhoid fever, "collected for the most part from the service of Chantemesse." He regarded the reaction of value because of its constant presence in typhoid fever, its absence in other febrile conditions, its remarkable agreement with the Widal reaction, and concluded that a reaction which "persists two days after the installation of the reagent into the conjunctival sac always signifies typhoid fever, though it may have occurred several years before."

Orszag [4] used "extracts of virulent typhoid bacilli obtained post mortem" and obtained positive reactions in all of the fifteen cases of typhoid fever tested, and also in seven of eighteen convalescents from the disease. In spite of these findings, he states that "the test is not practical as no constant toxin can be obtained," and that the reaction is positive in normal persons and in those ill with diseases other than typhoid fever.

Malisch [5] employed in his work a reagent prepared by Merck & Co., according to the technic of Chantemesse. The firm standardized the preparations made by them in terms of the minimal lethal dose for guinea-pigs weighing two hundred and fifty grams, and recommended the use of one-seventieth of a minimum lethal dose for each test. Malisch made observations on fifty-four cases of typhoid fever, in the febrile stage of the disease, and obtained positive reactions in all of them. Of sixty-six patients, afebrile or convalescent, 66 per cent showed positive reactions; of sixty patients, ill with diseases other than typhoid fever, 10 per cent reacted positively; and of fifty normal persons only three showed a "slight, very transitory conjunctival reddening." He found further, that of thirteen cases of typhoid fever seven gave a positive reaction when an extract of *Bacillus paratyphosus* was used as the antigen, and that of eleven typhoid fever patients, all showed the marked conjunctival inflammation when an extract of the colon bacillus was applied to the eye. He stated that, although the reaction is not absolutely specific the response in patients infected with the *Bacillus typhosus* is more constantly present, is more marked and persists for a longer time than it does in other conditions.

Meroni [6] used a different antigen. This author precipitated bouillon cultures of typhoid bacilli with absolute alcohol and dried the precipitate in vacuo. One gram of the pulverized residue was dissolved in 10 cubic centimeters of normal salt solution, and two drops of this solution were used in making each test. With this reagent Meroni obtained positive results in all of the eighteen typhoid fever patients examined, and negative results in eighteen patients ill with other diseases. Like Chantemesse, he too emphasizes as diagnostic the persistence of the reaction longer than six hours after its appearance.

Hamburger [7] modified the preparation of the reagent even more, employing the aqueous extract of an emulsion of typhoid bacilli containing three thousand million organisms in the cubic centimeter. He examined forty-eight cases with the following results: twenty-seven cases of typhoid fever all reacted positively, fifteen cases of other diseases all reacted negatively, and of six cases, clinically typhoid fever, but having negative blood cultures and agglutination reactions, four reacted positively. He stated that the intensity of the reaction bears no relation to the stage of the disease, except in so far as it is perhaps more intense during the febrile period.

Floyd and Barker [8] considered Hamburger's reagent "too strong," and used a similar preparation of one-third the strength, *i. e.*, aqueous extracts of a suspension containing one thousand million bacilli in a cubic centimeter. They obtained positive reactions in 96 per cent of ninety-three cases of typhoid fever and negative reactions in 84 per cent of twenty-four "controls." The four "controls" reacting positively were all tuberculous, and in all the injection of the conjunctiva disappeared in from three to five hours According to these authors, the reaction is elicited only during the active stage of the infection, from the third day to the seventh week; it disappears during convalescence and reappears in relapses. The intensity of the response is greatest during the second week of the disease and in very toxic cases. They could establish no parallel between the results of the ophthalmo-reaction and the agglutination phenomenon, whereas a close parallel between it and the result of the blood culture was apparent. In six cases, having a positive eye test and a negative Widal reaction, the *Bacillus typhosus* was later recovered from the blood.

About the same time that the last cited article appeared, Beckers [9] stated that the reagent of Chantemesse, when used as directed by that author, was "much too strong." He formed this conclusion from the fact that six normal men gave positive eye reactions when tested with it. Using a dilution of the antigen of one-tenth of the strength recommended by Chantemesse, however, Beckers obtained positive results in seven of eight cases of typhoid fever and negative results in all of "several" normal people.

The large number of cases of typhoid fever annually treated in the wards of the Johns Hopkins Hospital affords an excellent opportunity for the study of this disease, and, in June of this year (1910), an investigation of the merits of the ophthalmo-reaction as an aid in the diagnosis of it was undertaken.

In the first series of observations made, the test solution was prepared exactly as recommended by Chantemesse, and of five cases of typhoid fever tested only three showed a positive reaction. The failure of two undoubted cases of typhoid fever to react, together with the statement of several authors that the weakness of the test lay in the fact that no uniform antigen could be obtained, suggested the necessity of modifying the preparation of it. The modifications had in view the securing of a substance which would cause a reaction in all cases of typhoid fever and which would not cause a reaction in those ill with other diseases, or in healthy individuals.

To Secure an Antigen Which Would Cause a Reaction in all Cases of Typhoid Fever.

One of the first cases tested furnished an idea which was followed out in all of the subsequent work. The patient in his initial infection gave a negative eye reaction on the nineteenth day of the disease. One week later a well defined relapse developed, with exacerbation of fever, a palpable spleen and the presence of typhoid bacilli in the circulating blood; and now a drop of the test solution in the other eye caused a marked inflammatory reaction of the type which later will be described as specific.

The explanation suggested itself that perhaps the first instillation in the right eye had so sensitized the patient that he reacted to the second test. This possibility was excluded by the failure of similar repeated instillations in non-typhoids to cause a like response.

It next seemed plausible that the relapse might be the result of a reinfection of the patient with a different strain of bacilli, and that he, therefore, reacted differently, because of different antibodies formed. Naturally, this inference called to mind Durham's theory of relapse in fevers.

Durham,[20] it will be remembered, regards any given infection "not as the result of the action of a number of identical infecting individuals, but as the result of the action of the sum of a number of infecting agents, each of which is similar, but not identical in nature." In other words, an apparently simple infection with a given organism is a complex phenomenon brought about by a number of varieties and subvarieties of that organism, each of which is neither identical with nor equivalent to the other. If in an infection, the number of varieties is approximately equal, a "normal or isozymic" infection results; whereas, if one or more of the varieties preponderate greatly, an "abnormal or anosozymic infection" occurs.

Evidence that such varietal quantitative differences between various strains of typhoid bacilli exist, is found in the work of Pfeiffer,[21] who showed that the protective bodies which appear in the blood are not equivalent in different typhoid convalescents; that is, "different sera contain unequal proportions of the constituent units which together are designated as antibody. Again, in the bacteriolytic, or Pfeiffer test in guinea-pigs, it had been found that a certain quantity of an immune serum will give complete lysis when one strain of *Bacillus typhosus* is used as the antigen, and only partial lysis results when another strain of the bacillus is used. Also, in agglutination tests, Durham showed that the smallest amount of a serum necessary to agglutinate all the bacilli in an emulsion of one strain, did not, of necessity, cause a similar complete agglutination of another strain.

This hypothesis would explain the relapse of our patient as follows: the initial infection was an "anisozymic" one, the patient producing immune bodies in large amounts against the predominating strain A, and relatively small amounts of antibodies against the less numerous members of strain B. As a consequence, though the patient overwhelmed the strain A, his serum was unable to prevent the multiplication and action of strain B, and he therefore suffered a demonstrable reinfection or relapse. Presumptive evidence in favor of this explanation is given by the fact that the serum of two rabbits, the one immunized with strain A, the other with strain B, agglutinated the strain, inoculation with which had called forth its production, in greater dilution than it did the other.

It is fair to assume that, inasmuch as in an infection with typhoid bacilli variations in the degree of the bactericidal and the bacteriolytic immunity are found, that quantitative variations at least in the degree of sensitization with different strains of the organism might occur. If this were true, an individual sensitized with one race of bacilli would show a marked reaction when a strain of the organism identical with the infecting one was used as the antigen, and a less marked reaction, or even no demonstrable response, when a heterologous strain was employed. To prevent, if possible, such variations in reaction, numerous strains of typhoid bacilli were used in making the test preparations, in the belief that the union of many races of the organism would neutralize these quantitative differences and yield a product of greater value.

Preparation of the Antigen.

Ten or more flasks, each containing about half a litre of plain bouillon, were inoculated with eighty different strains of typhoid bacilli and incubated at 37.5° centigrade, for twenty hours. The cultures were then centrifugalized, and the sedimented bacteria washed free of broth. A homogeneous suspension of the washed organisms was made in sterile distilled water and after heating in a water bath for two hours at 60° centigrade, was dried in vacuo. When thoroughly desiccated the mass was ground in an agate mortar with a small amount of sodium chloride crystals for three hours. With constant grinding, sterile distilled water was added drop by drop, in the proportion of ten cubic centimeters of water to each gram of pulverized bacilli, and the resulting emulsion warmed for two hours at 60° centigrade. Heating for half an hour daily was repeated on three successive days, after which the supernatant fluid was slowly poured into ten volumes of absolute alcohol and the white flocculi which formed were dried in vacuo. The dried residue was finally ground to a powder, and one drop of the solution of ten milligrams of it in one cubic centimeter of water was used for each test.

The powder is stable when kept in tightly sealed dark containers, and remains active for months. Solutions of the reagent in water, however, deteriorate rapidly, and often are useless after three or four days.

It is desirable to use fresh preparations in carrying out the test.

Technic of Carrying Out the Test.

The conjunctivæ of the two eyes are carefully examined for signs of inflammation and, if none are found, the test is made as follows: If the right eye is used, the patient turns his head towards the left side. Purse the lower lid with the fingers, and with an eye dropper instil one drop of the antigen solution into the inferior conjunctival sac, so that it runs to the median canthus. It is necessary to prevent sudden closure of the lids before the drop has been well distributed over the conjunctiva, and to caution the patient not to rub the eye.

The time of the instillation is recorded, and the eye examined at short intervals, during the first twenty-four hours.

Description of the Reaction.

A. Typical or Diagnostic.—Description based on the observations made in seventy-five cases of typhoid fever.

Within one to five hours after a drop of the test solution has been introduced into the conjunctival sac, there is generally a moderate grade of injection of the blood vessels of the palpebral conjunctiva of the lower lid, reddening of the caruncle, lacrimation, usually not marked and often lacking, and a drop of yellow pus in the conjunctival sac. When the reaction is very marked, there may be suffusion of the bulbar conjunctiva generally limited to the inferior one-third or one-half of it. The reaction is usually maximal within six to ten hours, when, in addition to the changes noted, there may be reddening of the skin of the lids, slight edema of the lids, and slight chemosis. In almost every case the palpebral conjunctiva of the lower lid is now a bright purple in color and velvety in appearance.

After the tenth hour, the signs of acute inflammation very slowly subside, but congestion of the conjunctiva of the lower lid is still marked after twenty hours, often after forty hours, and occasionally as long as two hundred and forty hours.

Even when the inflammatory response is very great, and it is not so unusual to find it so, there is rarely any complaint of symptoms. In the entire series of cases reacting only one patient volunteered the statement that his "eye felt warm," and not a patient complained of pain or of photophobia. When questioned, most of the patients stated that, aside from "the sticking together of the lids" or "the watering of the eye," they had no discomfort whatever. In no instance did signs of deep-seated ocular inflammation develop.

In summary the essential characteristics of the typical reaction are:

a. Congestion of the blood vessels of the palpebral conjunctiva, usually maximal in from six to ten hours, when the membrane is deep purple in color.

b. The persistence of this congestion for at least twenty hours.

c. Lacrimation, purulent exudate and bulbar suffusion.

B. A Typical or Non-specific Reaction.—Not infrequently, normal persons, or those suffering from diseases other than typhoid fever, show signs of conjunctival inflammation following the introduction of the typhoid antigen into the conjunctival sac. The response in these cases differs from that seen in patients with typhoid fever, in the more constant presence and greater degree of injection of the visceral conjunctiva; in the larger amount of purulent secretion formed, and, in what is of greatest significance, the less constant development of a reaction in the palpebral conjunctiva and caruncle. Even when injection of the latter does develop, it is less intense and more transitory, fading rapidly in four to fourteen hours.

The fact that reactions of this type occur has led some observers to doubt the specificity of the ophthalmo-reaction in typhoid fever.

Results of the Application of the Ophthalmo-Reaction in Typhoid Fever.

From a study of Table I it will be seen that in seventy-five cases of typhoid fever the ophthalmo-test was positive in seventy-one and negative in four.

Of the nineteen cases examined during the first week of the disease, all but one reacted positively, and in that case repeated blood cultures and agglutination reactions were negative.

Of the twenty-five patients tested during the second week of the disease, every one gave a positive reaction. One of these cases showed a negative reaction on the eighth day and a positive reaction on the twelfth day.

Of the fifteen cases in the third week of the disease two failed to give the typical response. One of these cases had a negative blood culture and Widal reactions; the other had a positive Widal reaction on the same day that the eye test was tried.

Seven cases were examined during the fourth week of the disease and all reacted positively; and of four cases in the fifth week all developed the typical response except one, and that one had completely recovered.

Two patients in the sixth week and one in the eighth week showed positive reactions.

The earliest appearance of the reaction was on the third day of the disease, the latest on the fifty-seventh day.

Of fifteen patients, convalescent and afebrile, only three still gave the specific response.

In four patients with a relapse the reaction was positive early in the stage of reinfection.

Inflammation of the conjunctiva was noted as early as one hour after the application of the antigen, the average interval before it developed being two and a half hours.

The maximum changes were usually apparent by the sixth

TABLE I.

	Clinical Diagnosis.	Blood Culture.		Widal Reaction.		Ophthalmo-Reaction.					Pus.	Lacrimation.	Chemosis.	Edema Lids.	Symptoms.
		Result.	Day.	Result.	Day.	Result.	Day.	Appeared	Maximum	Duration hours.					
1	Typhoid Fever.	+	7	0	7; 14; 21	+	5	2	6½	48	+ +	+	0	+	"Eye feels warm."
2	do	+	9	0	9; 15	+	7	2	5½	37	+	0	0	0	0
3	do	+	9	0	9	+	6	2	6	51	+	+	0	0	0
4	do	+	8	0	5; 15	+	7	2	4	34	+	+	0	0	0
5	do	+	8	0	6	+	6	3	9	28	±	0	0	0	0
6	do	+	4	+	4; 20	+	3	4	8	26	±	0	0	0	0
7	do	+	6	0	6	0	6	..	..	..	0	0	0	0	0
8	do	+	9	0	8	+	6	2	5	80	+ +	+ +	+ +	+	Curious absence of symptoms with flagrant reaction.
9	do	0	6; 11	0	10; 15	+	5	1¾	7	60	+	0	0	0	0
10	do	+	10	0 +	10; 47	+	7	3	6	48	+	0	0	0	0
11	do	+	6	0 0	5; 12	+	7	4	6	40	+	+	0	+	0
12	do	+	9	0	9	+	6	5	9	56	+	0	0	0	0
13	do	+	8	0 +	6; 24	+	6	2⅓	9	52	±	0	0	0	0
14	no	+	6	0	6	+	4	3⅓	5⅔	96	+	+	0	+	0
15	do	0	6	0	6	+	6	1	6	30	+	+	0	+	0
16	do	+	6	0	6	+	5	2	6	44	+	0	0	0	0
17	do	0	2	0	2; 18	0	2	..	..	..	+	0	0	0	0
18	do	0	8	+	8	0 +	8; 12	6	10	27	+	0	0	0	0
19	do	+	10	0	16	+	8	1¾	8	58	0	0	0	0	0
20	do	+	10	0	10	+	8	4	10	50	0	0	0	0	0
21	do	+	9	0	10	+	8	3	6	34	+	0	0	0	0
22	do	+	12	+	12	+	8	2	6	36	+	0	0	0	0
23	do	+	8	0	8	+	8	1¾	5	40	+ +	+	0	+	0
24	do	+	9	0 +	8; 45	+	8	2	4	45	+	0	0	+ red	0
25	do	+	11	0	10	+	9	3	7	48	+	+	0	0	0
26	do	+	10	0	10	+	10	2	11	28	+	+	0	0	0
27	do	+	8	+	8	+	11	8	16	40	+	0	0	0	0
28	do	0	6	0	14	+	10	4	12	26	+	0	0	0	0
29	do	+	11	00+	11; 18; 50	+	11	2	4	43	+	0	0	0	0
30	do	+	3	00+	8; 39; 50	+	11	3	7	34	+ +	0	0	0	0
31	do	+	5	0 +	5; 34	+	13	2	6	48	+	0	0	+	0
32	do	+	5	0 0	5; 25	+	13	2	4	27	+	0	0	0	0
33	do	+	7	0 0	8; 30	+	13	2	4	30	+	0	0	0	0
34	do	+	2	0 0	2; 12	+	13	2	7	29	+	+	0	0	0
35	do	+	8	0	12	+	14	2	6	48	+	0	0	+	0
36	do	+	8	0 0	8; 14	+	14	2	4	28	+	0	0	0	0
37	do	—	..	0	13	+	12	..	..	30+	+	0	0	0	0
38	do	—	..	+	19	0	19	..	..	..	+	0	0	0	0
39	do	—	..	+	21	+	18	..	..	40+	+	0	0	0	0
40	Perforation.	0	15	0	15	+	15	1	2	35+	+	+	+	+	0
41	Typhoid Fever.	0	37	0000	10; 17; 24; 51	0	17	..	..	..	0	0	0	0	0
42	do	+	16	0 0	10; 21	+	15	4	6	34	+	0	0	0	0
43	Perforation.	+	17	0	19	+	16	4	7	40	+	0	0	0	0
44	Typhoid Fever.	+	19	0	19	+	16	4	8	29	+	0	0	0	Quotidian chills. Eye test positive 3 days before B.C.
45	do	+	20	+	20	+	16	2	7	240	+	+	+	0	0
46	do	0	16	+	17	+	16	4	6	50	+	+	0	0	"Eye smarts."
47	do	+	6	0	16	+	16	3	5	48	+	0	0	0	0
48	do	+	16	+	16	+	16	3	10	30	+	0	0	0	0
49	do	+	15	00+	11; 15; 43	+	19	1½	7	65	+	+	0	0	0
50	do	+	19	0	21	+	19	3	7	33	+	+	0	0	0
51	do	+	22	0	22	+	20	1	5	32	+	+	0	0	0
52	do	+	21	+	40	+	21	2	6½	58	+	0	0	0	0
53	do	+	9	0	40	+	24	2	6	45	+	+	0	0	0
54	do	+	11	0 +	11; 31	+	24	1	6	49	+	+	0	0	0
55	do	—	..	0	14; 24	+	24	..	..	36	+	+	0	0	0
56	do	+	37	0 +	27; 49	+	25	3	7	60	+	+	0	0	0
57	do	+	13	000	7; 23; 32	+	25	2	6	60	+	+	0	0	0
58	do	+	16	0 0	14; 30	+	27	2	6	45	+	0	0	0	0
59	do	+	10	0 0	12; 22	+	27	1	6	29	+	+	0	0	0
60	do	—	..	+	22	+	30	..	..	30+	+	0	0	0	0
61	do	—	..	0	30	+	36	..	..	30+	+	0	0	0	0
62	do	—	..	0	15	+	42	..	..	30+	+	0	0	0	0
63	do	—	..	+	18	+	31	..	..	30+	+	0	0	0	0
64	do	—	..	0	27	0	40	..	..	..	+	0	0	0	Up and about. Well.
65	do	+	36	+	36	+	36	1	6	42	+	+	0	0	0
66	do	—	..	+	30	+	47	..	..	30+	+	0	0	0	0
67	do	—	..	+	20	+	43	..	..	30+	+	+	0	0	0
68	do	—	..	+	16	+	57	..	..	30+	+	+	0	0	0
69	do	+	10	0	10	+	9	2	6	25	+	0	0	0	0
70	do	+	14	0	10	+	10	2	7	30	+	+	0	0	0
71	do	+	10	0	10	+	9	2	10	42	+	+	0	0	0
72	do	+	7	0	7	+	5	1	7	42	+	0	0	0	0
73	do	+	14	0 0	15; 30	+	13	3	4	58	+	+	0	0	0
74	do	+	8	0 0	9; 21	+	7	2	3	32	+	0	0	0	0
75	do	+	5	+	8	+	3	2	6	50	+	+	0	0	0

hour, occasionally as early as the second hour, and in one case they were delayed until the sixteenth hour.

The average duration of the palpebral injection was forty hours, the extremes being twenty-five and two hundred and forty hours.

The intensity of the reaction showed no constant variation with the severity of the infection or with the stage of the disease, except that it was more constantly present and more marked in the febrile, greatly intoxicated patients.

Especially worthy of note was the absence of symptoms, even when the inflammatory response was very intense: and the tendency of the most marked response to be localized in the palpebral conjunctiva of the lower lid and in the caruncle.

The results of the ophthalmo-reaction and of the blood cultures showed a striking similarity. In many instances the former was reported positive before the *Bacillus typhosus* was identified in cultures and in a greater number of cases the appearance of a positive eye test antedated by many days a positive agglutination reaction. Further, in three cases clinically typhoid fever the eye test was positive, whereas repeated blood cultures and Widal reactions gave negative results.

A closer scrutiny of the table shows, too, that the Widal reaction was positive as early as the ophthalmo-reaction in only twenty-three per cent of the cases.

Results of the Ophthalmo-Reaction in Other Diseases and in Health.

A total of one hundred and ninety persons, normal or ill with diseases other than typhoid fever, were examined for conjunctival sensitiveness to "typho-protein." Many (eighty-four) of them were febrile, and, in the case of several, a tentative diagnosis of typhoid fever was made at the time the test was given. In this latter group especially the value of the ophthalmo-reaction as a diagnostic aid was apparent as the few illustrative cases here detailed will show.

Case 28.—A woman with fever, torpor and lethargy, on examination was quite negative except that the spleen was enlarged. When first seen the clinical picture closely simulated typhoid fever and it was not until three days after the ophthalmo-reaction had been found negative, that the finding of the so-called "attenuated cocci of subacute infective endocarditis" in the blood made the diagnosis clear.

Case 43.—A man, on admission, had fever with a relative bradycardia, toxæmia with torpor, and a palpable spleen. The ophthalmo-reaction was reported negative within twenty-four hours after his entering the ward, whereas a negative report of the blood culture and Widal reaction was not available until twenty-four hours later. This patient soon developed arthritic lesions and a diagnosis of infectious arthritis was made.

Case 153.—A young boy with fever, bradycardia, leucopenia, and slight splenic enlargement. In this case, the diagnosis of typhoid fever seemed the more probable as the patient was one of a family of seven, six of whom were ill at the time with the disease. Here the finding of a negative ophthalmo-reaction was later supported by the negative results of blood culture and agglutination reactions, and by the short course of the disease with rapid defervescence.

Detailed analysis of more cases is unnecessary. Reference to Table II shows that in the examination of fifty-six pathological conditions in no instance was a reaction like that seen in typhoid fever noted. In many, several or all of the manifestations described above as characterizing the non-specific type of reaction did develop, *i. e.*, purulent secretion, lacrimation, injection of the bulbar conjunctiva, and transitory reddening of the palpebral conjunctiva and of the caruncle.

In two cases only did a reaction develop which was difficult to interpret. From both patients a history of previous infection with the *Bacillus typhosus* was elicited, and in both the injection of the palpebral conjunctiva of the caruncle was only of moderate grade and subsided in less than eighteen hours.

The striking dissimilarity between the conjunctival reaction following the instillation of the test solution into the conjunctival sac of persons having typhoid fever, and of those ill with other diseases or normal, must be apparent, and speaks strongly for the specificity of the reaction.

Nature of the Typhoid Ophthalmo-Reaction.

It is now a well known fact that when a foreign protein is introduced into the body, by a parenteral route, a condition of hypersensitiveness results, and that this condition of altered response to a second dose of the antigen is specific. The existence of such an allergic, anaphylactic or hypersensitive state may be manifested by a general reaction, so violent as to lead to an acute lethal exitus, or by local manifestations of varying degrees of severity.

Typhoid fever is the result of a general infection with the *Bacillus typhosus*. The clinical symptoms are due to the action on the organisms of specific antibodies (bacteriolysins) in the serum of the patient, leading to the liberation of endotoxins. The endotoxins are themselves of a protein nature or are bound in some intimate way with the proteins of the bacilli. Hence it seems logical to infer that a patient infected with the *Bacillus typhosus* will develop a condition of allergy or anaphylaxis to the proteins derived from this organism.

Complete proof of this hypothesis unfortunately cannot, as yet, be given. A general or constitutional reaction we may not attempt to produce in a patient already overwhelmed by his infection, and experimentally we can glean no data, for the reason that typhoid fever has not been successfully produced in animals. This much can be shown, however, that guinea-pigs can be so sensitized by intraperitoneal injections of typho-protein, that a second toxic dose, introduced intravenously or by the post-orbital route, will cause acute fatal anaphylactic shock.

Local manifestations of an allergic condition in man have usually been produced by applications of the antigen to the conjunctival or to the nasal mucosa, by inunction or by intradermal or subcutaneous injection. The ophthalmo-reaction in tuberculosis is perhaps the best known example of a local anaphylactic reaction, and a parallel between it and the ophthalmo-reaction in typhoid fever can readily be drawn.

Both diseases result from infection with a bacillus; in both the general symptoms proceed from the reaction of the tissues of the body to the toxic substances liberated from the infecting

TABLE II.

	Diagnosis.	Febrile.	Afebrile.	Ophthalmo reaction.	Remarks.
1	Cerebrospinal lues	..	+	Negative.	Purulent secretion. Visceral injection lasting 10 hours.
2	Pulmonary tuberculosis	..	+	..do	Purulent secretion.
3	do	+	..	do	Do.
4	do	+	..	do	No signs of reaction.
5	do	+	..	do	Do.
6	do	..	0	do	Do.
7	do	+	..	do	Do.
8	do	..	0	do	Small amount of pus in sac. Slight injection bulbar conjunctiva.
9	do	..	0	do	Small amount of pus in sac.
10	do	+	..	do	Slight injection lower half bulbar conjunctiva.
11	do	..	0	do	No signs of reaction.
12	do	+	..	do	Do.
13	do	+	..	do	Drop of pus at median canthus.
14	do	+	..	do	Slight injection bulbar conjunctiva persisting 8 hours.
15	do	+	..	do	Slight injection bulbar conjunctiva persisting 6 hours.
16	do	..	0	do	Drop of pus at median canthus.
17	do	..	0	do	Lids matted with dried secretion.
18	do	+	..	do	Do.
19	do	..	0	do	No signs of reaction.
20	do	+	..	do	Caruncle reddened. Injection persisted 7 hours.
21	do	..	..	do	No visible reaction.
22	do	+	0	do	Much purulent secretion. Slight bulbar injection.
23	do	..	0	do	No purulent secretion. Slight bulbar injection.
24	do	+	..	do	No purulent secretion or bulbar injection.
25	do	+	..	do	Do.
26	do	+	..	do	Do.
27	do	+	..	do	Do.
28	Subacute infectious endocarditis	+	..	do	Clinically suggested typhoid fever. Blood culture showed attenuated cocci.
29	do	+	..	do	Clinically suggested typhoid fever. Blood culture showed attenuated cocci.
30	do	+	..	do	Purulent secretion and bulbar suffusion.
31	Malarial fever, tertian	+	..	do	Do.
32	do	+	..	do	No evident reaction.
33	do	..	0	do	Do.
34	do	+	..	do	Do.
35	Malarial fever, æstivo autumnal	+	..	do	No evident reaction, except pus at canthus.
36	do	+	..	do	Slight bulbar injection lasting 4 hours.
37	do	+	..	do	Slight bulbar injection lasting 6 hours, with pus in sac.
38	do	+	..	do	No evident reaction.
39	Chronic lymphatic leukæmia	..	0	do	Do.
40	Catarrhal jaundice	+	..	do	Do.
41	do	+	..	do	Do.
42	do	+	..	do	Do.
43	Infectious arthritis	+	..	do	Injection of visceral conjunctiva.
44	do	..	0	do	Do.
45	do	..	0	do	Do.
46	Psychoneurosis	..	0	do	Injection of visceral conjunctiva lasting 7 hours.
47	do	..	0	do	Injection of visceral conjunctiva.
48	do	.	0	do	Do.
49	do	..	0	do	Do.
50	do	..	0	do	Do.
51	do	..	0	do	Do.
52	do	..	0	do	Do.
53	do	..	0	do	Do.
54	do	..	0	do	Do.
55	do	+	..	do	No visible reaction.
56	Chorea	+	..	do	Do.
57	Chorea with endocarditis	+	..	do	Do.
58	Uncinariasis	..	..	do	Do.
59	Myocardial insufficiency	..		do	Do.
60	do	..	..	do	Do.
61	do	..	..	do	Do.
62	do	..	..	do	Do.
63	do	..	..	do	Do.
64	do	+	..	do	Do.
65	Myocardial insufficiency. Broncho-pneumonia	+	..	do	Do.
66	do	..	0	do	Do.
67	Myocardial insufficiency	..	0	do	Do.
68	Myocardial insufficiency. Jaundice	..	0	do	Small amount of purulent secretion.
69	do	..	0	do	No visible reaction.
70	Myocardial insufficiency	..	0	do	Injection lower third bulbar conjunctiva.
71	do	..	0	do	No visible reaction.
72	Myocardial insufficiency. Acute nephritis	+	..	do	Do.
73	Myocardial insufficiency. Pulmonary infarction	+	..	do	Do.
74	Myocardial insufficiency	..	0	do	Do.
75	do	..	0	do	Do.
76	do	..	0	do	Do.
77	Myocardial insufficiency. Cerebral embolism	+	..	do	Injection lower third of bulbar conjunctiva.
78	Myocardial insufficiency	..	0	do	No visible reaction.
79	do	..	0	do	Do.
80	do	+	0	do	Do.
81	do	+	..	do	Injection of caruncle persisting 3 hours.
82	do	..	0	do	Lacrimation and purulent secretion.
83	Acute lobar pneumonia	+	..	do	Slight injection lower third of bulbar conjunctiva.
84	do	+	..	do	Small amount of purulent secretion.
85	do	+	..	do	No visible reaction.
86	Ulcus ventriculi	..	0	do	Do.
87	do	..	0	do	Do.
88	Carcinoma ventriculi	..	0	do	Do.
89	do	..	0	do	Do.
90	do	..	0	do	Do.
91	Gastric neurosis. Hyperacidity	..	0	do	Do.
92	do	..	0	do	No visible reaction.
93	do	..	0	do	Do.
94	do	..	0	do	Do.
95	Gastric neurosis. Anacidity	..	0	do	Do.
96	Epilepsy	..	0	do	Do.
97	do	..	0	do	Do.
98	do	..	0	do	Do.
99	Chronic constipation	..	0	do	Do.
100	do	+	..	do	Do.
101					

TABLE II—Continued.

	Diagnosis.	Febrile.	Afebrile.	Ophthalmo reaction.	Remarks.
102	Chronic constipation	..	0	Negative.	No visible reaction.
103	Acute gastroenteritis	+	..	.....do ...	Do.
104	Acute enterocolitis	+	..	.....do	Do.
105	.....do	+	..	.....do	Do.
106	Appendicitis	+	..	....do	Reddening of caruncle persisting 2 hours.
107	.....do	+	..	.....do	No visible reaction.
108	Cholelithiasis	..	0	.....do	Do.
109	Cholelithiasis with jaundice	+	..	.....do	Do.
110	Acute cholecystitis	+	..	....do	Do.
111	.....do	+	..	.....do	Lacrimation and small amount of purulent secretion.
112	Acute Peritonitis	+	..	.....do	No visible reaction.
113	Tuberculous peritonitis	+	..	....do	Do.
114	.....do	+	..	.....do	Do.
115	.....do	+	..	....do	Do.
116	Pleurisy with effusion	+	..	.....do	Do.
117	.....do	+	..	.....do	Do.
118	.....do	+	..	.....do	Do.
119	Miliary tuberculosis	+	..	.....do	Do.
120	.....do	+	..	.....do	Do.
121	.....do	+	..	.....do	Transitory injection of the bulbar conjunctiva.
122	Tertiary syphilis	..	0	.....do	No visible reaction.
123	.....do	+	..	.....do ...	Do.
124	Arterio-sclerosis	..	0	.....do	Do.
125	.....do	..	0	.....do	Do.
126	.....do	..	0	.....do ...	Do.
127	.....do	..	0	.....do	Much pus, lacrimation, bulbar injection and reddening of caruncle and palpebral conjunctiva lasting 12 hours.
128	.....do	..	0	.....do	No visible reaction.
129	Arterio-sclerosis. Broncho-pneumonia	+	..	.....do	Do.
130	Arterio-sclerosis	..	0	.....do	Do.
131	.....do	..	0	....do	Do.
132	.....do	..	0	.....do	Do.
133	.....do	..	0	.....do	Do.
134	Cirrhosis hepatis	..	0	.....do	Do.
135	.....do	+	..	.....do	Do.
136	.....do	..	0	.....do ...	Do.
137	Aortic aneurism	..	0	.....do	Do.
138	.....do	.	0	.....do ...	Do.
139	.....do	..	0	.....do	Do.
140	Tabes dorsalis	..	..	.....do ...	Do.
141	.....do	..	..	.....do	Do.
142	.....do	..	..	.....do ...	Do.
143	General paresis	..	..	.....do	Do.
144	.....do	..	..	....do ...	Do.
145	.....do	..	..	.....do	Do.
146	Acute anterior poliomyelitis	+	..	.....do	Do.
147	Epidemic cerebrospinal meningitis	+	..	.....do	Do.
148	Tuberculous meningitis	+	..	....do	Do.
149	.....do	+	..	.....do	Do.
150	Acute mania	..	0	.....do	Do.
151	Acute cystitis	+	..	.....do	Do.
152	.....do	+	..	.....do	Do.
153	Acute pyelitis	+	..	.....do	Small amount of pus. Injection visceral conjunctiva.
154	Chronic nephritis	.	0	.....do	No visible reaction.
155	.....do	..	0	.....do	Do.
156	.....do	..	0	.....do	Do.
157	Chronic nephritis. Broncho-pneumonia	+	..	.....do	Do.
158	Chronic nephritis	..	0	.....do	Do.
159	Diabetes mellitus	..	0	.....do	Do.
160	Polyglandular dyscrasia	..	0	.....do	Do.
161	Pernicious anæmia	..	0	.....do	Do.
162	Acute bronchitis	+	..	.....do	Do.
163	.....do	+	..	.....do	Do.
164	.....do	+	..	.....do	Do.
165	Influenza	+	..	.....do	Do.
166	.....do	+	..	.....do	Lacrimation.
167	.....do	+	..	.....do	Bulbar suffusion.
168	Septicæmia-streptococcus	+	..	.....do	No visible reaction.
169	Septicæmia staphylococcus	+	.	.....do	Small amount of pus. Slight bulbar injection.
170	Spondylitis	..	0	....do	No visible reaction.
171	Fractured spine	..	0	.....do ...	Do.
172	Cryptorchidism	..	0	.....do	Do.
173	Hodgkin's disease	..	0	.....do	Do.
174	Polyserositis	+	..	.....do	Do.
175	Morphinism	..	0	.....do	Do.
176	Amœbic dysentery	+	..	.....do	Do.
177	.....do	..	0	.....do	Do.
178	Normal adults	..	0	.....do	Do.
179	.....do	..	0	.....do	Do.
180	.....do	..	0	.....do	Do.
181	.....do	..	0	.....do	Do.
182	.....do	..	0	.....do	Do.
183	.....do	..	0	.....do	Do.
184	.....do	..	0	.....do	Do.
185	.....do	..	0	.....do ...	Do.
186	.....do	..	0	.....do	Do.
187	.....do	..	0	.....do	Do.
188	.....do	..	0	.....do	Drop of pus at median canthus.
189	.....do	..	0	.....do	Lacrimation.
190	.....do	..	0	.....do	Slight bulbar injection.

agent by the action of specific antibodies upon them. In both diseases the instillation of a weak solution of the specific antigen into the conjunctival sac causes the development of local inflammation. In neither disease does the conjunctival instillation of other antigens result in a similar tissue response, nor do normal individuals or those ill with other diseases show a like reaction, when similarly treated. In other words, the response is specific.

It is true that neither a conjunctival nor skin reaction has been produced in animals sensitized with typho-protein. It is equally true that similar failure has resulted when the production of local reactions has been attempted in animals similarly sensitized with tuberculo-protein.

Animals infected with typhoid bacilli show neither local nor general manifestations when typho-protein is injected subcutaneously, whereas in tuberculous animals both types of reaction have been successfully produced. But for this apparent difference a ready explanation is found in the fact that, whereas tuberculosis does occur spontaneously in animals and can be experimentally produced in them, the reverse is true of typhoid fever.

From the foregoing data, strong presumptive proof, at least, is given that the ophthalmo-reaction in typhoid fever is analogous to the ophthalmo-reaction in tuberculosis, and that if the latter is a manifestation of allergy, so in all probability is the former.

The specificity of the ophthalmo-reaction in typhoid fever is not negatived by the occurrence of atypical responses in healthy individuals. Such reactions may rather be interpreted as an indication of a "group anaphylaxis." Every one harbors in his intestinal tract myriads of colon bacilli which, like typhoid bacilli, belong to the so-called dysentery group. From time to time, possibly as the result of trauma of the mucosa or of infection with other organisms, these bacilli find a portal of entry, and as a consequence of the invasion of the tissues by them, the body reacts by the formation of antibodies against them. The bacteriolysins formed cause destruction of the bacilli, colon-protein is liberated, and sensitization probably develops.

Evidence for this assumption, that in health there is probably a certain degree of hypersensitiveness to the protein of colon bacilli, is found in the presence of colon agglutinins and bacteriolysins in the serum of healthy individuals. More direct proof is furnished by the observation that a solution containing one half to one milligram of colon-protein prepared in the same way as the typho-protein used in the ophthalmo-reaction, when applied to the conjunctiva caused an inflammatory response in nearly 75 per cent of the fifty normal persons examined. That sensitization with the protein of colon bacillus carries with it a certain degree of sensitization to the protein of typhoid bacilli, can be shown experimentally. In a series of preliminary experiments we have found that guinea-pigs sensitized by intraperitoneal injections of typho-protein can be fatally intoxicated by a post orbital injection of colon protein, and, similarly, that intraperitoneal injections of colon protein will render guinea-pigs hypersensitive to typho-protein.

CONCLUSIONS.

1. A solution of one-third to one-half of a milligram of "typho-protein" in a drop of water, when instilled into the conjunctival sac of a patient ill with typhoid fever, causes a typical inflammatory reaction.

2. The most constant results are obtained when the "protein" is derived from numerous different strains of the bacilli.

3. The typical response shows definite characteristics:

a. It is limited to or is maximal in the palpebral conjunctiva of the lower lid and in the caruncle.

b. It appears in one to five hours, reaches its maximum intensity in about six hours, and persists twenty-four hours or longer.

c. The most characteristic sign is the deep purple congestion of the palpebral conjunctiva of the lower lid and of the caruncle.

4. The reaction is relatively specific and can be differentiated readily from the response produced in other diseases and in health.

5. The results of the typical ophthalmo-reaction are in close agreement with those of the blood culture, and in establishing a diagnosis early in the disease the eye test is apparently of greater assistance than is the Widal reaction.

6. A positive reaction is obtained most often during the active febrile stage of the disease and is least often shown by patients convalescent and afebrile.

7. The advantages of the test are its simplicity, the fact that it can be applied and interpreted by the physician, the rapidity with which it becomes manifest, and the absence of any discomfort to the patient.

8. The ophthalmo-reaction in typhoid fever is probably to be considered as an evidence of an allergic state, in spite of the fact that in typhoid fever an anaphylactic condition is not generally believed to exist.

9. The atypical reactions developing in healthy individuals may likewise be considered as evidence of a group sensitization to members of the so-called "Dysentary Group of Bacilli."

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THE STRAUSS TEST FOR HEPATIC INSUFFICIENCY.

By JOHN W. CHURCHMAN, M. D.,
Late Resident Surgeon, The Johns Hopkins Hospital.

The purpose of this study was to determine by clinical application the value of the Strauss test for hepatic insufficiency[1]. The need for clearer information as to the condition of the liver than is given by present methods of physical examination was well illustrated by the recent occurrence in the Johns Hopkins Hospital of two cases of acute degenerative hepatitis, in neither of which was the diagnosis made. In both cases a very large part of the liver parenchyme had been thrown out of commission by the advanced destructive lesion present—a fact which a reliable test for hepatic function would have revealed.

TECHNIQUE.

In making this study the following technique was employed. The night before the urinary examinations were to be made, all food was discontinued after the evening meal. At 6 a. m. the following morning, a specimen of urine was obtained and the patient given 100 gm. of levulose with 400 cc. of water or weak tea. Additional specimens of urine were collected at 7, 8, 9 and 10 a. m. The patient was then allowed to receive the diet which he had been getting before the test. The 5 specimens of urine (1 obtained before, and 4 after the levulose was ingested) were examined for levulose. The test of Seliwanoff was used for the detection of the levulose. Reliance, however, was not placed on this test alone; in cases about which there could be the slightest doubt, Borchardt's test was also made. In a few cases Fehling's and Nylander's tests were used; and when any doubt still persisted, Cipollina's modification of the phenyl-hydrazine test was regarded as the court of last appeal. Jolles' modification of the Ihl-Pechmann test and Hammarsten's spectroscopic test were made in a few cases.

The Reaction of Seliwanoff.—A few cubic centimeters of a mixture of equal parts of water and concentrated hydrochloric acid are heated for about 1½ minutes with an equal amount of urine and a few crystals of resorcin. If levulose is present, a reddish brown color appears, followed by a brownish precipitate which is soluble in alcohol[2]. A fair number of normal urines give a transient reddish color when heated with hydrochloric acid, but the color soon disappears and no sediment forms; when levulose is present, on the other hand, the test becomes more characteristic as the urine cools. Indican may give a reddish color similar to that given by levulose, though the precipitate, if well-marked, excludes indican. If doubt on this score exists, however, the indican should be removed by adding an equal quantity of Obermayer's reagent to a few cubic centimeters of urine, and extracting in a Strauss funnel with chloroform. The chloroform is then allowed to run off, and the Seliwanoff and Borchardt tests are made.

The Reaction of Borchardt.—This test should be made whenever the Seliwanoff reaction is not perfectly convincing. The urine is heated with hydrochloric acid and resorcin, as in the Seliwanoff test. It is allowed to cool and made alkaline in an evaporating dish with sodium carbonate. It is then poured into a test tube and shaken out with acetic ether, to which, if levulose is present, a yellow color is imparted.

Cipollina's Modification of the Phenyl-hydrazine Test.—Four cubic centimeters of urine, 5 drops of pure phenyl-hydrazine, and 0.5 cc. of glacial acetic acid are boiled, over a small flame, for 1 minute. Four or five drops of KOH solution (sp. gr. 1.16) are added, and the mixture again boiled gently for a few seconds. It is then allowed to cool and examined for crystals of phenyl levulosazone. If none form, filter, wash the filtrate through with 60 per cent alcohol, and evaporate over a water bath. Allow to cool and examine for crystals of phenyl levulosazone.

PRECAUTIONS.

Certain precautions are necessary in performing the Strauss test. Levulose, in large amounts, is sometimes nauseating and the patients may vomit after taking it. Unless this fact is kept in mind the test may be regarded as negative when really no levulose has been ingested. The reaction of Seliwanoff, though in general satisfactory—particularly when a heavy brownish precipitate forms—must be controlled as already indicated. In the presence of much indican, great care must be used. The reaction is not extremely delicate and was negative in several of my cases in which crystals of phenyl-glucosazone could be readily obtained. The Seliwanoff and Borchardt tests usually agreed; in one or two cases they were at variance.

MATERIAL STUDIED.

A series of fifty-two cases was studied, the patients being taken pretty much at random from the medical and surgical wards of the Johns Hopkins Hospital. Of these 52 patients, a positive diagnosis of hepatic disease could be established clinically in 12. In 38 cases the liver was absolutely normal, the majority of these patients being admitted to the surgical service for some strictly surgical condition. In two cases the clinical picture was not clear, cirrhosis of the liver being suspected but not established.

[1] Strauss: Deutsche med. Wchnschr., 1901, XXVII, 757.

[2] Great confusion exists in the directions for the Seliwanoff test to be found in the literature. The technique is carelessly described; the amount of HCl to be added is variously stated, and the impression is always conveyed (even in Seliwanoff's original report [Ber. d. d. chem. Gesellsch., 1887, XX, 181]) that the typical color reaction appears promptly. As a matter of fact it is usually necessary to heat the specimen, by boiling in the flame for about one minute, or by leaving in boiling water in a water bath for several minutes, in order to get satisfactory results.

RESULTS.

The results obtained may be summarized as follows:

I. Liver normal clinically: 38 cases
- Alimentary levulosuria present, 9 cases (23.68%)
  - Marked reaction, 5 cases
  - Moderate reaction, 3 cases.
  - Slight reaction, 1 case.
- Alimentary levulosuria absent, 29 cases (76.31%)

II. Liver abnormal clinically: 12 cases.
- Alimentary levulosuria present, 10 cases (83.33%)
  - Marked reaction, 4 cases.
  - Moderate reaction, 1 case.
  - Hepatic change secondary, 5 cases.
- Alimentary levulosuria absent, 2 cases (16.66%)

III. Clinical picture doubtful: 2 cases. Alimentary levulosuria present, 2 cases (100%).

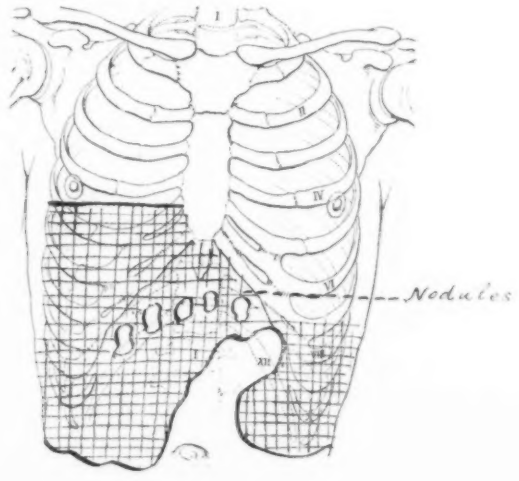
The general implications of these results are obvious at a glance. The preponderance of negative reactions in the normal cases and of positive reactions in the abnormal cases is, so far as it goes, evidence of the value of the Strauss test as indicative of the functional capacity of the liver. The presence, however, of a sufficiently large number of positive reactions in the normal group, and of two cases, in the abnormal group, with an absolutely negative reaction, is final proof that the test is not conclusive.

EVIDENCE AGAINST THE VALUE OF THE STRAUSS TEST.

Of the cases (29) with normal livers, which failed to show an alimentary levulosuria, nothing further need be said. The interesting and important cases are those (1) in which, with an abnormal liver, the reaction was negative, and (2) in which, with a normal liver, the reaction was positive. Of these cases a short account is given.

1. *Well marked signs and symptoms of advanced hepatic lesions, with total absence of alimentary levulosuria, i. e. negative Strauss test: 2 cases.*

1. T. F., male, 39 years old. Symptoms of 18 months' duration (enlargement of abdomen and recurring attacks of jaundice without pain). Diagnosis of syphilitic cirrhosis at first made, but Wassermann reaction was negative and there was no change in signs or symptoms under injections of salicylate of mercury. Marked ascites, some jaundice, and bile in the urine. Patient under observation for 9 months and no change in condition observed. Liver irregular and very hard; outlines as shown in chart:

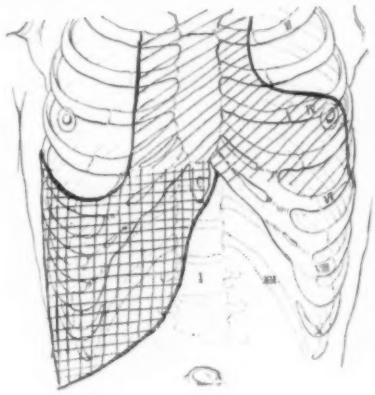


Results of the Strauss test: *

	AUGUST 26, 1911.	AUGUST 27, 1911.				
	S	S	B	F	N	PH
1	0	1	Specimens not obtained.			
2	0	2				
3	0	3	0	0	0	0
4	0	4	0	0	0	0
5	0	5	0	0	0	0

2. H. F., male. Enlarged liver and ascites associated with myocardial insufficiency and arterio-sclerosis. Total absence of alimentary levulosuria.

Chart showing outlines of liver and cardiac dulness:



Results of Strauss test:

	MAY 2, 1911.		JUNE 7, 1911.			
	S	B		S	B	I
1	0	..	1	0	..	..
2	0	..	2	0	..	..
3	?	0	3	?	0	0
4	0	..	4	0	..	..
5	0	..	5	0	..	..

The evidence afforded by these two cases, but particularly by the first, is of the greatest importance in estimating the value of the Strauss test. In Case 1 the anatomical changes in the liver were advanced and the symptoms were definitely due to the liver and to no other organ. Yet there was not a suspicion of lowered levulose tolerance, neither the Seliwanoff nor the more delicate tests indicating a trace of levulose in the urine. If it be argued that the Strauss test is one of function, not of anatomical condition, and that in these patients compensatory hypertrophy may have kept the functional capacity up to normal, the reply is that in that case it will be a difficult matter to accumulate evidence which will have any value at all in deciding the worth of the test as an aid in differential diagnosis, for compensatory hypertrophy could always be assumed to explain the negative results.

* In this and the succeeding tables:

S = Seliwanoff's test.
B = Borchardt's test.
F = Fehling's test.
N = Nylander's test.
PH = Phenyl-hydrazine test.
I = Indican test (Obermayer).
J = Jolles' test.

2. *Alimentary levulosuria, i. e. positive Strauss reaction, without signs or symptoms of hepatic disease: 9 cases.*

(a) Cases in which the *reaction was well marked: 5 cases.*

1. I. G., female. Fracture of fibula and os calcis. Liver not enlarged, reaching just to the costal margin; no symptoms indicating any hepatic lesions.

Results of the Strauss test:

	S	B	N	PH
1	0	..	..	..
2	+	+	+	..
3	+	+	+	+
4	+	?	+	+
5	0		..	..

2. R. M., male, weight 124 pounds. Tuberculous adenitis, cervical. Liver just palpable at the costal margin; no symptoms indicating any hepatic lesions.

Results of the Strauss test:

	S	B	I	F
1	0	..	?	0
2	0	..	..	..
3	++	+	+	+
4	+	+	..	+
5	+	+	..	+

3. H. D., male, weight 140 pounds. Fistula in ano; no enlargement of liver or symptoms indicating any hepatic lesions.

Results of Strauss test:

	S	B	N	PH
1	Specimen not saved.			
2	0	..	..	..
3	++	+	+	+
4	+	+	?	+
5	0	..	..	..

4. Male, weight 161 pounds. Tuberculous adenitis, cervical: no enlargement of liver or symptoms indicating any hepatic lesions.

Results of the Strauss test:

	S	B
6 a. m.*.....	0	..
9 a. m.....	++	+
10.30 a. m....	++	+
12.30 p. m....	+	+

*Specimens could not be obtained at the routine hours.

5. J. C., male, weight 140 pounds. In perfect health, nothing to indicate any disease of the liver either at present or in the previous history.

Results of the Strauss test:

	S	B	I	F
1	?	..	..	..
2	?	?	..	0
3	+	+	+	..
4	+	+	+	..
5	0	..	..	..

(b) Cases in which the *reaction was moderate: 3 cases.*

1. R. D., male, weight 125 pounds. Fracture of both bones of forearm. No enlargement of liver or symptoms indicating any hepatic lesions.

Results of the Strauss test:

	S	B	N	PH
1	0	..	..	..
2	0	..	..	..
3	++	+	+	+
4	Trace	Trace	..	..
5	Specimen not saved.			

2. T. F., male. Arterio-sclerosis and chronic nephritis; liver not enlarged, no symptoms indicating any hepatic lesion.

Results of the Strauss test:

	S	B	F
1	0	.	..
2	0	..	..
3	++	+	?
4	+	?	..
5	0	..	..

3. T. D., male, weight 151 pounds. Simple hernia; no enlarge- not enlarged, no symptoms indicating any hepatic lesions.

Results of the Strauss test:

	S	B	I	F
1	0	..	+	0
2	0	..	+	0
3	++	+	+	+
4	Trace	..	+	0
5	0	..	0	0

(c) Cases in which the *reaction was definite but slight: 1 case.*

1. R. G., female, weight 101 pounds. Paralysis of leg following an old anterior poliomyelitis. No enlargement of liver or symptoms indicating any hepatic lesions.

Results of the Strauss test:

	S	B	I	F
1	0	..	..	..
2	Specimen not saved.			
3	+	..	Trace	+
4	0	..	..	0
5	0	..	..	..

Summary: Liver normal, but reaction positive: 9 cases.

Marked reaction: 5 cases
Moderate reaction: 3 cases } 9 cases.
Slight reaction: 1 case

The Strauss reaction is thus seen to be positive in a certain number of cases with perfectly normal livers. Even if the most favorable light be thrown on the test by eliminating the moderate and slight reactions, 5 cases (13.15 per cent of the normal cases) remain, which show a strong reaction. The most marked reaction in the whole series was shown by a man weighing 161 pounds, who was in the hospital for tuberculous adenitis and whose liver was perfectly normal clinically. The urine in this case showed abundance of levulose four hours and a half after it was ingested and the test was still quite positive at the end of six hours and a half. None of the cases of hepatic disease gave a more marked test than this patient.

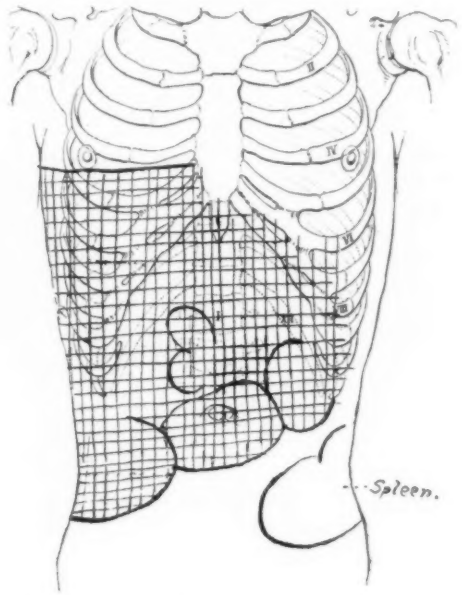
EVIDENCE FOR THE VALUE OF THE STRAUSS TEST.

So much for the evidence afforded by this study against the value of the Strauss test. There were, on the other hand, ten cases in the series in which definite hepatic lesions were accompanied by an alimentary levulosuria. In five of these the liver lesion was the primary and predominating feature of the clinical picture: in the remaining five there were symptoms indicating liver changes, but these were probably secondary to lesions in the heart and elsewhere.

3. *Definite clinical evidence of disease of the liver, accompanied by an alimentary levulosuria (i. e. positive Strauss test): 10 cases (liver lesion primary, 5 cases; liver lesion possibly secondary, 5 cases).*

(a) Cases in which the *reaction was marked: 4 cases.*

1. L. O., female, 34 years old. Has had three miscarriages, but no definite history of syphilis; Wassermann reaction negative; emaciation, anemia, enlarged spleen; liver irregular, hard and much enlarged (outlines as shown in chart).



Results of the Strauss test:

MAY 7, 1911.

	S	B	F	J
1	0	..	..	..
2	Trace	..	..	..
3	++	+	+	+
4	++	+	..	..
5	Trace	+	..	+

MAY 12, 1911.*

	S	I
1	0	..
2	0	..
3	0	† Free iodine.
4	++	† Free iodine.
5	0	..

* Test repeated, only 50 gm. of levulose being given.
† Patient is taking iodides.

2. N. F., male. Definite signs of cirrhosis of the liver with increase in the size of the organ (hepatic dulness reached from the IVth rib to a point 3 cm. below the costal margin in the right mammillary line). Large amount of fluid in abdomen; patient under observation for ascites for over 4 years, during which time he was tapped 27 times.

Results of the Strauss test:

	S	B	PH
1	0	..	..
2	0	..	..
3	+	+	+
4	+	+	+
5	Specimen not obt'n'd.		

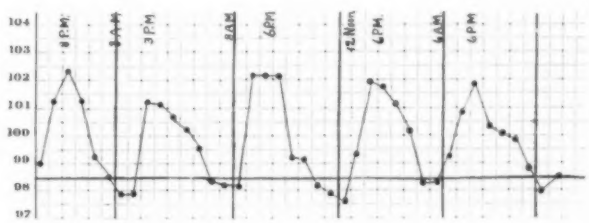
3. A. E., male, 57 years old. Had been suffering from dropsy, emaciation, and weakness for one year. Mitral and tricuspid insufficiency, right hydrothorax, edema of the extremities, fluid in the abdomen (10 liters withdrawn by tapping), enlarged abdominal veins; liver diminished in size, reaching from the IVth rib to a point 3 cm. above the costal margin in the right mammiliary line.

Results of the Strauss test:

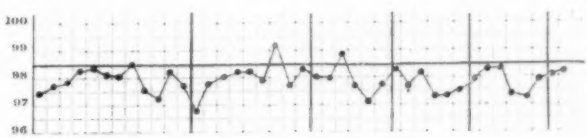
	S	B	I	F
1	Specimen not saved.			
2	+	..	..	+
3	++	Trace	Free iodine.*	+
4	+	?	+	..
5	?	0	..	0

* Patient is taking iodides.

4. A. B., male. This was a very interesting and important case under the care of Dr. Downey at the Baltimore Eye, Ear and Throat Hospital. The clinical features, while somewhat obscure, seem to justify its inclusion under the cases in which the liver was known to be diseased. The patient came to the hospital for an ulcerative lesion of the skin of the cheek, which was spreading into the ear. An attempt was made, by a plastic operation, to reconstruct the external auditory canal; at the same time a mild, chronic infection of the middle ear was treated by curettage, by way of the mastoid. Nineteen days after operation, the patient began to have fever, the character of which is shown in the chart. Daily chills occurred at the time of the maximal temperature.



There was nothing in the wound to account for this temperature; the leucocyte count was normal, and there was no relative increase in the polymorphonuclear neutrophiles. A septic process was excluded by the blood picture and by the total absence of symptoms. No malarial parasites could be found and the administration of quinine was quite without effect. There were sugges-



tive scars on the shoulders and legs and the Wassermann reaction was found to be strongly positive. A probable diagnosis of visceral lues was made, the case resembling those reported by Man-

naberg and others. The liver was very slightly enlarged, on percussion; palpation was of no help on account of abdominal rigidity. Specific treatment was instituted, beginning with salvarsan. The temperature promptly dropped to normal (see chart) and has remained so ever since (nearly three months later). The Strauss test, made before treatment was started, showed a very marked alimentary levulosuria; the Seliwanoff reaction, 5 hours after ingestion, was stronger than in any other case in the series, and remained strongly positive 6 hours after ingestion.

Results of the Strauss test:

JULY 1, 1911.

	S	B	PH
1	0	..	..
2	0	..	..
3	+	..	..
4	++	..	+
5	+++	..	..
6	+	..	+

After the patient had been on treatment for a little over two months and had been running a normal temperature for this length of time, the Strauss test was repeated. The Seliwanoff reaction was negative in all the specimens, as was the Fehling reaction; and, though sugar was shown to be present in the 2d, 3d and 4th specimens, by the Nylander and phenyl-hydrazine tests, the very marked difference from the reaction of two months previously was most striking.

Results of the Strauss test:

SEPTEMBER 21, 1911.

	S	B	F	N	PH
1	?	..	0	0	0
2	0	Trace	0	+	+
3	0	"	0	+	+
4	0	"	?*	+	+
5	0	"	0	?	0

* No true reduction; greenish precipitate on standing.

Visceral lues was probably present in this case. Conclusive evidence that the liver was involved is wanting; but the clinical similarity of the case to the reported cases of hepatic lues suggests this possibility. The complete cure by specific treatment and the simultaneous disappearance of a positive alimentary levulosuria are the interesting features.

(b) Cases in which the *reaction was moderate: 1 case.*

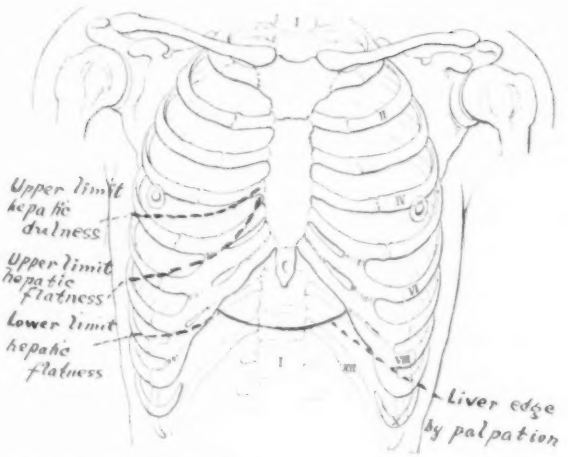
1. M. O., female. Jaundice, loss of weight, abdominal ascites, clay-colored stools, bile in the urine, no pain; nodular enlargement of the liver, the lower edge of which reached 7 cm. below the costal margin in the right mammillary line. Diagnosis of syphilitic cirrhosis.

Results of the Strauss test:

	S	B	N	PH
1	0	..	..	..
2	0	..	..	..
3	+	+	..	+
4	+	..	..	..
5	?	..	..	..

(c) Cases in which the *hepatic lesion was probably secondary: 5 cases.*

1. B. F., male. Edema of the legs, abdominal ascites, distention of the abdominal veins, hydrothorax; uncertain whether this was a case of cirrhosis of the liver or of polyserositis due to some other cause. Liver not enlarged, outlines as shown in chart:



Result of the Strauss test:

	S	B	PH
1	0	..	..
2	0	..	..
3	Trace	..	..
4	"	Trace	+
5	"	..	..

2. M. F., male. Myocardial insufficiency, lipomatosis, liver very slightly enlarged but causing no symptoms definitely referable to it.

Result of the Strauss test:

	S	B	I
1	0	..	..
2	0	..	..
3	+	+	0
4	0	..	..
5	0	..	..

3. W. M., male. Mitral insufficiency, edema of extremities, abdominal ascites, very slight jaundice, no enlargement of liver; doubtful whether the case is to be regarded as one of cirrhosis of the liver or myocardial insufficiency with chronic passive congestion.

Results of the Strauss test:

	S
1	0
2	Trace.
3	++
4	++
5	++

4. S. F., male. An obscure case; probably ulcerative aortic endocarditis and mitral insufficiency; enlargement of the liver which reached 4 cm. below the costal margin in the right mammillary line. Not primarily a liver case, though the hepatic changes undoubtedly played a part in the clinical picture.

Results of the Strauss test:

MAY 12, 1911.

	S
1	0
2	0
3	0
4	Trace.
5	0

JUNE 7, 1911.

	S	B
1	0	..
2	0	..
3	++	+
4	+	+
5	Trace	0

5. L. F., male. Jaundice, bilateral hydrothorax, abdominal ascites, edema of the legs, liver not enlarged.

Results of the Strauss test: *

	S	B
1	0	..
2	0	..
3	Trace	Trace
4	..	..
5	0	..

Summary: Liver abnormal and reaction positive: 10 cases.

Marked reaction: 4 cases
Moderate reaction: 1 case
Hepatic change secondary: 5 cases
} 10 cases.

DOUBTFUL CASES.

In two cases of the series the clinical picture was suggestive of hepatic disease, but the diagnosis was uncertain. In both, alimentary levulosuria was present.

1. N. C., male. Gastric hyperacidity, liver slightly enlarged, reaching 1 finger-breadth below the costal margin. In the right mammillary line, edge palpable; no symptoms referable to the liver.

Results of the Strauss test:

	S	B	PH
1	0	0	0
2	Specimen not obt'n'd.		
3	++	+	+
4	?	?	+
5	0	..	..

2. H. C., male. Slight jaundice of the scleræ. Liver not palpated, no ascites; diagnosis obscure, possibly cirrhosis.

Results of the Strauss test:

	S	B	PH
1	0	0	0
2	0	..	..
3	+	+	+
4	+	+	..
5	+	+	..

HYPOPHYSEAL CASES.

Through the kindness of Dr. Cushing I had the opportunity to study a few hypophyseal cases with regard to the occurrence of alimentary levulosuria (16 examinations in 9 patients). The findings in this condition have already been published by Cushing;[3] and I mention the cases here simply by way of calling attention, in this connection, to the fact that at least one condition is known in which the levulose tolerance is upset by a lesion outside the liver. This disturbance in levulose tolerance may, of course, be brought about indirectly by some effect of the hypophyseal lesion on the liver function; but the fact that the disturbance occurs must be borne in mind in deciding as to the value of the Strauss test as an indication of disease of the liver.

CONCLUSIONS.

Alimentary levulosuria, as measured by the Strauss test, though not a constant feature, is present in a large proportion of cases of hepatic disease (83.33 per cent in this series). It is also present in a goodly percentage of normal patients (23.68 per cent in this series), and is absent in certain cases of definite and extensive disease of the liver. Neither its presence, therefore, nor its absence is to be regarded as conclusive evidence of the condition of the liver. The explanation which Strauss offers for the absence of alimentary levulosuria in certain cases of known liver disease, based on the assumption that hypertrophy has compensated for the loss of liver substance and has kept the levulose tolerance from falling below normal, may be correct; but it can hardly be advanced in support of the clinical value of the test as an aid in differential diagnosis. The test is one, it is true, of functional capacity and not of anatomical condition; but to assume a normal function in a definitely diseased liver, simply because there is no reduction of the tolerance for levulose, is to beg the question entirely. Similarly, to explain the positive reactions in normal individuals by assuming liver changes which have caused neither signs nor symptoms, is to settle the question quite independently of the only evidence available.

The reduction of the sugar tolerance and the presence of an alimentary levulosuria in patients with a functional hyperplasia of the posterior lobe of the hypophysis, indicates that the metabolism of levulose may not be quite the simple matter proposed by Strauss on the basis of certain suggestive results in hepectomized frogs.

To grade the amount of levulose, which normal patients should tolerate, according to the size of the liver (as indicated by the body weight) would be an improvement on the present method of using a constant amount of levulose for all patients, irrespective of size. For an adult weighing 70 kilos, the ingestion of 100 gm. of levulose without its appearance in the urine might be regarded as indicating a normal levulose tolerance. For heavier individuals proportionately larger amounts should be used. Unfortunately, large quantities of levulose are nauseating and cannot always be retained; so that this modified technique might be difficult to apply to very heavy patients.

The urinary examinations were made in the clinical laboratory of the Johns Hopkins Hospital, to which I had access through the kindness of Dr. Roger S. Morris.

* Patient was unable to retain the levulose, vomiting shortly after it was taken; so that the slight reaction, after the absorption of probably only a fraction of the levulose given, is more significant than it would otherwise be.

[3] Goetsch, Cushing and Jacobson: Johns Hopkins Hosp. Bull. 1911, XXII, 165.

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OBSERVATIONS ON SEPSIS AND ANTISEPSIS IN MEDICINE.[1]

By William Sydney Thayer, M. D.,
Professor of Clinical Medicine, The Johns Hopkins University.

In answer to the cordial invitation to speak before you this evening, I am going to ask your indulgence for a few reflections upon two phases of antisepsis in internal medicine.

The thoughts that I am going to try to bring before you to-night, though by no means original, have, however, haunted me more and more during the last several years and seem worthy of expression.

To one who is familiar with the history of medicine for the last fifty years, the transformation of surgery is a never ending source of satisfaction and of wonder. From the fundamental ideas of Lister, the evolution of our modern knowledge of the nature and causes of wound infection and of the measures necessary to prevent it, has progressed rapidly until the art of surgery has reached the remarkable position which it occupies to-day.

Twenty-five years ago, when I was a student, a surgical operation which involved the opening of a large joint or a serous cavity, was looked upon almost in the nature of an experiment. The critical "third day" was anxiously awaited. If that period were passed without fever, we drew a deep breath and felt that the main danger was over. How changed is all this to-day!

Time and again, twenty-five years ago, I have heard one of the most eminent of American surgeons say, in discussing some operative procedure: "If one be not careful, the first thing he knows he will find himself in the peritoneal cavity—*fatal peritonitis!*" Now that surgeon is opening the peritoneal cavity every day of his life with perfect assurance and with almost absolute safety. The dangers of infection are hardly considered. 'Tis only the question of the loss of blood, the condition of the heart and lungs and the effects of the long anaesthetization—and operations, of the possibility of which one barely dreamed, are performed with perfect security every day. With these facts we are all familiar. There is however one phase in the development of modern surgery which has not received the attention that it would seem to deserve, and that is the change in the character of the surgeon himself. One used to think of the surgeon of the past as a courageous, manly fellow with a good knowledge of anatomy, a steady and clever hand, skilful in the setting of the limbs and the application of bandages—a technician—not especially a student.

In many countries the surgeon used to be looked upon as belonging to a class somewhat lower than that of the physician—one who used his hands rather than his head. Not long ago it was the physician who was the more careful student, who was rather more likely to attend to minutiae in the practice of his art. The surgeon was the strong, vigorous, highly trained technician who, when the physician said "go ahead," was not afraid to bear the immediate responsibility of what was often an hazardous undertaking.

This relation does not, certainly, exist to-day. With the initiative of Lister, the surgeon has applied carefully, and conscientiously, the teachings of the laboratory to the practice of his art. He soon learned that the antiseptics which were destructive to the infectious agent were likewise injurious to the human organism; that the important question was not the application of antiseptics to the wound, but the prevention of the entrance of the infectious agent; not the treatment of the infection after it was present, but the prophylaxis against infection.

Hand in hand with this knowledge, a great change came over the practice of surgery and over the surgeon. From the dashing operator of a generation or two ago, the surgeon has become a man highly trained in the most careful and minute laboratory methods of prophylaxis. Every step in his extensive preparations for an operation must be carried out with exactness. These methods, many of which he and his associates have elaborated themselves by study in the bacteriological laboratory, are absolutely necessary for the success and safety of the operation. If he neglects one point in his precautions, the fatal infection may occur, and if it do occur, he feels that it must be his fault. Moreover, the public knows this, and the public, and, in some instances, the law, may hold him responsible. The average surgeon has become a very different man from his ancestor of fifty years ago. He is not only an exact and careful artist, but, far more than this, these habits and methods of work have led him into fields of research as a technician and as an investigator of which his forebears had little idea. Wherever the best surgery is done, other studies, not only in technique of the surgical art, but the pathology and etiology of disease are almost always pursued, and the leading surgeon of to-day is commonly an eminent physiological and pathological investigator.

Let us enter, for a moment, a modern surgical operating room:

In the ante-room, the sterilizers and autoclaves for the preparation of all material and instruments to be used in connection with the work—the surgeon himself going through a long, deliberate and exact process in the mere cleaning of his hands; donning his rubber gloves; his freshly sterilized coat; the cap upon his head; the sterile gauze about his nose and mouth; the operating room and table, both of material such as can most easily be kept clean and aseptic. The patient is placed upon the table—the region about the point of operation thoroughly cleansed and sterilized and covered with sterile gauze and towels. The nurse and the assistants, all prepared with like care in their sterile garments; the on-lookers, obliged to keep at a proper distance themselves, but even they, wearing

[1] Address delivered before the Jefferson County Medical Society, March 30, 1911, and reprinted, with permission of the editor, Dr. A. T. McCormack, from the Kentucky Medical Journal, August 15, 1911.

clean linen coats, those few who are to stand close to the surgeon, clad as he, in a sterile gown, but perhaps without armholes, so that even the temptation to touch is frustrated; their mouths and noses covered with sterile gauze, caps upon their heads: the absolute, scrupulous cleanliness of everything. Then note the freedom and safety with which the surgeon explores the most vital parts!

About the surgical operation of to-day there is a truly scientific exactness. Indeed, I am often moved to the reflection that we rarely feel the anxiety about *any* operation to-day that we used to feel about *every* operation when I was a house physician twenty-three years ago. All these preparations, all this experience, all these exact prophylactic methods are directed to save the life of the single individual patient on whom the surgeon is about to operate.

We look at the great achievements of surgery with unusual satisfaction and pride. We are fascinated and bedazzled by their magnitude. But when the layman asks us internists what we can show him in our branch of the medical art which can compare with the progress of antiseptic surgery we, on our own side, are not slow in pointing to the immense progress which has been made in our knowledge of the nature and causes of infectious diseases; of what we have learned as to many of the internal secretions, and as to their relations to various forms of disease; of the application of his knowledge to the treatment of diphtheria, of cerebro-spinal meningitis, of tetanus, of myxoedema and cretinism; to the prophylaxis of cholera and plague.

Is there anything more wonderful in surgery than our achievements in the prophylaxis against yellow fever? This progress is indeed wonderful and hopeful. Like the surgeon, we internists are giving ourselves to the careful study in laboratory and clinic of many pathological and etiological problems. But is there not perhaps another phase of the situation which we sometimes forget? The surgeon has banished hospital gangrene and wound infection from his wards by his own individual, careful, exact, prophylactic methods. Have we internists introduced like methods for the prevention of disease into our daily practice?

Let us go back to the operating room: While the surgeon, surrounded by his corps of assistants and nurses, is carefully at work, his medical colleague enters with his staff. Among them he passes into the room to take a glimpse at the work of his associate. He knows that the rules for the ordinary onlooker are not for him. He has not time for such excess of precaution: neither have his assistants. Making his way to the elbow of the operator while the assistants stand aside with their hands raised in the air, in order to avoid touching him, and forgetting that he has no gauze over his mouth, he talks freely with his face near the wound or over the tray in which lie the sterilized instruments. Then he leaves the room on his way to his special precincts, the wards.

It is summer time, the sun is shining through the open and unnetted windows. In the long line of beds lie the patients prepared for the visit. The polished floor, the white coverlets, the nurses in their trim white dresses and caps, the plants and flowers, lend an air of freshness and brightness to the room, which is cheering and enlivening.

The first patient is suffering from cardiac disease. Soon, however, we come to the bed of an individual with pulmonary tuberculosis. He should not be in the ward. Cases of pulmonary tuberculosis are not admitted to the wards of this hospital which is intended to care only for acute and curable diseases—but somehow or other this case has slipped in, and here he is. On the table nearby is his sputa cup—on its edge, a little of recently expelled sputa lies exposed, and on this bit of sputa is clustered a group of flies.

A short distance away, sitting up in bed and smiling, is a convalescent from typhoid fever with his thin chicken-like hair and that delicate complexion which suggests the scrubbing of frequent baths. A little farther on lies his neighbor, at the height of the disease, dull, apathetic, somnolent, with his eyes and mouth half open. About his lips and teeth are crawling flies that have come from whence—we know not, and are going—heaven knows whither. The doctor sits on the edge of the bed while making a physical examination. In the course of this examination, his hand, introduced under the bed clothes, detects the fact that the vesical sphincter has involuntarily relaxed. The doctor has a cold in his head, and interrupts his examination frequently by blowing his nose, his handkerchief in the hand which a moment ago was under the bed clothes. On leaving this patient he may, or may not, remember to wash his hands before passing on to the bed of a convalescent from influenza, who, interested in the progress of the visit, has put down his half-finished glass of milk, about which flies are already gathering.

The nurses, clean and bright in aspect, are called quickly from bed to bed—from the typhoid patient to the consumptive, to the convalescent from influenza; when they can, they wash their hands, but it is often impossible.

On the wall of the ward is posted a notice setting forth the precautions which should be taken with regard to bed clothes, eating utensils, excreta and bath water of the patient with typhoid fever. As we pass out of the ward we look into the lavatory—how many of the precautions set forth in the directions upon the wall are here carried out? Sometimes, especially in a female ward, where the work is wholly under the charge of nurses, they may be observed strictly—too often, however, we find that the bed clothes of the typhoid and tuberculous patient are put into the common receptacle, and handled by more than one individual before they are sterilized. The directions for the disinfection of the stools and urine, of bed pans and urinals are carried out, alas, neither according to the letter, nor the spirit of the directions. The orderly, untrained and unimpressed with the importance of his work, moves from patient to patient without washing his hands, and carries out the printed precautions in a most perfunctory manner. The bath water, rarely sterilized, is allowed to run into the drain.

At the end of the visit, the physician washes his hands without removing his coat, and passes from the wards to his motor.

Next, perhaps, he visits a case of dysentery in a private family. Here again, the house is unnetted, the flies are omni-

present. Few or no precautions are taken with regard to the disposition of the excreta. A few directions may be given to the family with regard to the washing of their hands or to the sterilization of the excreta, but too often this advice is purely perfunctory, and is neglected by the family.

How rare it is to see really careful antiseptic precautions carried out in hospital or in private house! When we have seen these things, may we not well pause and reflect upon the difference between the procedure of the physician and that which we have seen in the operating room. What a contrast! On the one hand the cleanliness, the careful, rigid observance of most minute antiseptic and aseptic details, time-consuming though they be; on the other, lack of any adequate antiseptic measures. Patients with contagious diseases lying side by side with others in conditions peculiarly susceptible to infection; flies everywhere, ready to spread the contagion from individual to individual or from one patient to the nutriment of another; —physician, nurse and orderly circulating freely among all these patients—the physician in his ordinary clothes, sitting perhaps on the bed of a typhoid or dysenteric patient, using his handkerchief which he carries from place to place with him in his dirty hands; chaos and lack of system in the lavatory! Verily the contrast is striking! There may be, there are, exceptions to this picture, but too often it is true, and 'tis hardly to our credit as physicians.

"But," we object, stirred by this odious comparison, "the problem is different. You are comparing a ward with an operating room. Look at the surgical ward—are the conditions there essentially different?" Yes, they are different. There is, perhaps, much to desire in the surgical ward. The windows may be unnetted, the flies may be there, the conditions in the adjoining lavatory may not be essentially better than in the medical ward, but the typhoid, the tuberculous, the dysenteric patients, where are they? There is no one in the surgical ward with a contagious disease and those parts which might especially be subject to contagion are protected by elaborate bandages and dressings.

"Ah, yes," says the objector, "this is all very well, you know, however, what I mean. I am talking about individuals. Does not the medical man do his duty by the individual just as well as does his colleague, the surgeon? In the care of his patient with typhoid fever does he not give the same attention to minutiae? Is he not just as particular and just as conscientious? Is he any more open to criticism?"

Well, let us see. Where are the dangers of infection in the surgical wards? "In wounds," you answer. But these are protected in the most careful and scrupulous manner. "In the medical ward the patient with typhoid fever is already infected," you say, "and the problem is different." Very true, but when he is convalescent, is it not reasonable to believe that he is more subject to infections of other sorts than another? Is he not then more or less comparable to an open wound, and if so, how about his tuberculous neighbor and the flies? Are we protecting him as the surgeon protects his wounds? Hardly!

"But," says the objector, "this comparison is unfair. You are praising the surgeon because of his attitude to the individual case, and blaming the physician because he is not taking like measures to protect all of the rest of the world." In this assertion there are elements of justice, for the problems before the physician and surgeon to-day are somewhat different in detail if not in principle.

The surgeon, for the most part, is dealing with the wound which, with study and care, he has learned to make cleanly, and to preserve from infection. His duty to-day is more particularly toward a single individual. The physician is dealing with patients who are already infected. That infection he can in no way eradicate. His duty is to maintain the forces of the patient until he himself has overcome the invader, and to protect him from further injury. The great difference, however, between the duties of the physician and the surgeon, lies in the fact that every one of the infected individuals is a source of danger to those about him, and it is the obvious and necessary duty of the physician to use every means in his power to prevent the spread of the disease from the individual who is under his care—not only to the special case in his immediate vicinity, but to the many unknown individuals who may be reached by the dissemination of the infectious agent.

But has the problem before the surgeon never been similar? Consider for a minute the story of hospital gangrene, once the infection was there, the condition was almost beyond relief, but by the application of antiseptic and aseptic methods the surgeon has done far more than save the individual case, he has eradicated the disease. How has he done this? Not only by the exercising of scrupulous cleanliness in his operative technique, but in the careful protection of his patient from any sort of association with an infected individual.

Let there be an instance of streptococcus infection in a surgical ward—how quickly 'tis removed to the isolating pavilion. "Ah, yes," says the objector, "this is true, but that case of streptococcus infection is a source of immediate danger to those about him, and if the infection spreads, it is almost certain to end in the death of one of the individuals who is under the special care of the surgeon. In the medical ward, however, contagion from typhoid fever or dysentery is not very likely, and if it does occur, the chances of a fatal issue are so very much less that it is not unnatural that such rigid precautions should not be taken."

This objection again has elements of truth, and contains, doubtless, the kernel of explanation as to why we physicians have been and are so careless in these matters. The main reason for our negligence is the relative infrequency of contagion—the relative mildness of the infection when it does occur. An occasional case of typhoid fever breaking out among nurses and physicians in a large hospital is passed almost unnoticed. We hardly realize until we look carefully into the matter that our own negligence is responsible for its development.

But there is another side of the question which lends a very grave aspect to the situation. The lack of proper antiseptic and aseptic precautions on the part of the surgeon is followed, as a rule, by evil results with regard to one individual alone,

or at the most to a few patients in his ward, or his own practice. The lack of antiseptic precautions on the part of the physician, in the care of a single case of typhoid fever, may, under proper circumstances, give rise to an explosive epidemic, followed by hundreds of deaths.

Regard it as we may, we must come to the painful conclusion that physicians as a body have been content to limit their practice to the treatment of infections after they have occurred, while the surgeon has long since passed beyond this, and has recognized that his most important duty lies in prophylaxis against this infection.

That it should be more natural for the surgeon to perceive and appreciate this duty from the character of his practice, in that negligence affects him more directly, may be true, but this detracts in no way from the great and important duty which lies before the physician—a duty with which, at the moment, he has hardly grappled.

What steps then, ought we to take? Some of us, I am sure, must feel like saying to ourselves, "Go to the surgeon, thou sluggard!" Indeed, we might do worse. The work must probably begin in the large clinics where such problems can best be attacked, where the example can best be set. What should we do? First, we should see to it that contagious diseases, such as pulmonary tuberculosis, typhoid fever and dysentery, should not be treated in the general wards.

1. There should be special typhoid wards, special tubercular wards and special isolating wards in which diseases such as bacterial dysentery may be cared for.

2. Precautions such as those now supposed to be taken in connection with typhoid fever should be taken in the care of patients with diseases such as pneumonia or influenza.

3. Orderlies and nurses with bad colds or tonsilitis should not be allowed to attend regularly to susceptible individuals or to those in whom the contraction of the malady might produce grave results, such, for instance, as patients suffering with mitral disease.

4. Every hospital ward should be thoroughly and effectively netted against flies and mosquitoes. The omission of a precaution so elementary in its necessity as this should be regarded as criminal negligence.

5. Not only nurses and orderlies, but attending physicians, should wear clean uniforms or gowns, whenever attending wards containing contagious diseases, and should remove them on leaving the wards. And among contagious diseases I include such maladies as typhoid fever, tuberculosis and dysentery.

6. All attendants should invariably and thoroughly wash their hands on leaving a ward or a bed containing a patient suffering with an acute infectious disease.

7. The observance of the necessary precautions of sterilization of the clothes, eating utensils, excreta and bath water of all patients with infectious diseases, should be as rigidly and thoroughly enforced as are the antiseptic rules in the surgical operating room.

8. Cultures should be taken from the urine and faeces of all typhoid patients before their discharge from the hospital and, as a rule, no patient should be discharged until his excreta are free from the infectious organism.

Similar steps should be taken with regard to dysentery.

If precautions such as these were uniformly adopted in our large hospitals, a great step would be taken, not only toward the immediate protection of the population of that institution and of the surrounding community, but toward the education of the medical and lay-public at large, for similar precautions should also be taken in connection with patients whom we are attending at their homes.

Suppose the patient be a sufferer from typhoid fever. The first step should be exactly that which was taken in the campaign resulting in the eradication of the epidemic of yellow fever from Havana, viz:

1. The house should be thoroughly netted. No flies from that patient should infect the food of his neighbors. Furthermore, when possible,

2. No one but the attendants should be allowed in the room of the patient.

3. If, however, it is necessary for one member of the family to be present, that individual should adopt all the precautions observed by physician and attendants.

4. The physician should wear a fresh, clean gown whenever he visits the patient. A sufficient supply of these garments should be kept, so that a fresh one may be worn at every visit. The gown should be placed immediately in a tin boiler and boiled after every visit of the doctor, so that in most cases one or two gowns would suffice.

5. The rules for the sterilization of the bath water, excreta, clothes, and eating utensils should be carried out in the same manner as in the hospital.

6. Final cultures should be made in the same way.

"Theorist and dreamer!" cries the objector. "This is all very well to talk about, but how about the expense and the time involved in such measures? Neither our shallow pockets nor our full days can suffice for such demands. This is a pleasing, but quite unrealizable fancy."

What a natural utterance! But reflect for a minute: What would the average surgeon of fifty years ago have said if one had suggested to him that, in the near future, it would be necessary to make the preparations which are now called for in connection with an ordinary surgical procedure—if one should have told him of the equipment required for the operating room—of the precautions of sterilization to be adopted with regard to instruments, ligatures, and indeed everything that touches the patient—if one should have suggested to him the preparations that the surgeon himself must make—the care of the hands, the costume, the gloves and the other minutiae connected with the preparation for an ordinary operation—if one should have assured him that all his wooden and tortoise shell instruments would be discarded in a few years as dirty and dangerous? If one had said these things to one of the best of surgeons fifty years ago, he would probably have regarded the individual who made such suggestions as a madman, and laughed at the absurdity of it all.

And one of his first objections might well have been the

enormous expense which such preparations would involve, and the utter impossibility of considering for a moment that such an extraordinary procedure should be practicable. And yet, to-day, we think of these preparations as a matter of necessity and duty and the man who fails to observe them is regarded as criminally negligent. Now procedures such as I have outlined are very far from being so elaborate or expensive as those which are recognized as wholly necessary in the surgery of to-day, and although the surgical antisepsis seems more urgent because of the immediate consequences of its non-observance, yet the neglect of proper medical antisepsis may mean, in any individual case, a result infinitely more serious.

The notorious and discreditable prevalence of typhoid fever in our country will continue until the time comes when we medical men and the public realize that it is to our carelessness, negligence and unclean habits that it is due. When we do realize this as a body, and when we attack the problem as our colleague, the surgeon, has done in connection with his branch of the healing art, then, and only then, can we begin to look forward to the day when we shall really control the prevalence of typhoid fever and similar infectious diseases as the surgeon has controlled wound infection.

This is but the beginning of the work that lies before us. I have not even touched upon the milk question—one of the gravest from the standpoint of public health—one toward which we physicians have been shockingly indifferent. Think again, of the conditions which exist among the poor and ignorant and of the scantiness of the measures which we adopt to-day to prevent the spread of typhoid fever by contagion, after all the lessons of the Spanish War and the admirable and illuminating studies of the German Health Bureau!

These problems must be dealt with by a thorough organization of our departments of public health—state, county and municipal—but the first step toward this end must be our insistence as individuals in each individual case on those measures which are necessary for the protection of the household and the public. Individual effort is the keystone of the prophylactic arch which spans the road to better days.

Let us turn now to another aspect of medical antisepsis—quite different from that which we have just been considering:

Some months ago a distinguished English physician said to me: "There is an immense amount of sepsis in medicine." To what, you may ask, did he refer? The observation was made in the course of a conversation upon the frequency with which small local foci of infection are overlooked—foci of infection which lie often at the root of grave general systemic disturbances—foci, which, of themselves, may produce little or no subjective, or, indeed, sometimes objective, disturbances. The speaker was referring especially to the anaemia and general debility which may be associated with the inflammatory processes occurring about teeth in interstitial gingivitis with tartar formation and the eventual development of pyorrhoea alveolarum—that common malady which may almost be regarded as an incident of advancing years, a condition to which few practitioners of medicine, and by no means all dentists, pay sufficient attention. It was indeed this casual remark which suggested to me the subject of my observations this evening.

Thorough oral antisepsis, particularly in regard to the gums, is a point of really great importance to which the physician, and indeed too often the dentist, pays far too little attention. The physician who insists that the patient with excessive tartar formation and bleeding gums place himself under the conscientious care of a competent dentist, will often be more than gratified to see the surprising effect upon the general health of the patient. More than this—he may avoid truly serious complications, for there can be no doubt that at times pyorrhoea and alveolar abscesses give rise to grave general results.

Let us then, for a moment, consider this aspect of sepsis and antisepsis in medicine:

The discovery of a local focus of infection which has been at the bottom of some puzzling general disturbance—anaemia, debility, fever, is an everyday occurrence in the practice of medicine—inflammatory disease of the adnexa in the pale, nervous woman who has made no complaint of local trouble—the chronic prostatitis or posterior urethritis or fistula-in-ano in man—the nasopharyngeal adenoids in the undeveloped, feeble child.

The variety of symptoms, however, which may result from such chronic foci of septic absorption is not always fully realized, nor is it generally understood that these local foci may really be difficult or even impossible to recognize in the course of the ordinary routine physical examination.

Again, it is interesting to note the frequency with which we have been in the habit of misinterpreting the significance of our own wise acts. The remarkable effect of removing nasopharyngeal adenoids on the development and growth of some children is an old story. The brilliant result, the transformation of a pale, feeble, dull youngster, with palpable glands in his neck and frequent unaccountable febrile attacks, into a healthy, robust child, is commonly attributed to the simple removal of a mechanical obstruction to respiration. As a matter of fact, however, this improvement is due in many, if not in most instances, to the elimination of a focus of chronic infection from which there has been a constant absorption of toxic substances and perhaps even of pathogenic micro-organisms.

That symptoms of chronic septic absorption from simple debility, languor, anaemia, and slight unaccountable febrile manifestations to sharp, intermittent fever, ague, arthritis, endocarditis and grave septicaemia, may be observed with chronic infections of the lymphatic tissue of the fauces and pharynx, is well known, but the frequency of such symptoms in the absence of any objective or subjective local manifestations is not so widely appreciated as might be desired.

'Tis especially to the work of J. L. Goodale, of Boston, that we owe our increasing knowledge of the importance of local disease of the upper respiratory tract as a cause of general systemic disturbance.

The first and main point upon which I would insist is the importance of a thorough investigation by a competent laryngologist of the faucial and pharyngeal tonsils in all cases of

general systemic disturbance, the cause of which is obscure. We are prone to pass by without consideration tonsils which are small and appear clean on the surface, forgetting or ignoring the fact that often enough 'tis the small buried sclerotic tonsil with crypts narrowed or closed at their orifices which is the most serious menace to the possessor. Such tonsils, mere shells filled with cheesy or purulent contents, are often associated with exceedingly grave general disturbance.

What a variety of manifestations may occur with unsuspected tonsillar infections may be illustrated by a few of my own experiences.

1. A young woman of 29 had been subject for two years to unaccountable febrile attacks which had finally led to a slight, regular, daily, evening rise of temperature. There were frequent "colds" and a rather annoyingly persistent cough. Tuberculosis was suspected, and the patient was sent to a sanitarium where she spent several months. The fever continued. Physical examination of the chest was wholly negative. The pelvic organs were free from disease. On inquiry it was found that there had been several attacks of tonsilitis in the preceding six years. The tonsils, not remarkable on superficial examination, were found to be badly diseased. Their removal was followed by the immediate disappearance of fever and a rapid return of good health.

2. A young woman of about 25 had had for nearly six months slight evening fever with debility and loss of weight. Her physician, suspecting tuberculosis, had put her under a rigid rest and open air treatment, during which, after several months, she had gained much weight, and the fever had disappeared. She had not had tonsilitis for at least ten years. The tonsils were rather large, the surface glazed, the crypts evidently closed; small pin-head yellowish spots were seen beneath the mucosa. On removal, they were found to be badly diseased. Moreover, the naso-pharynx contained a large cyst full of foetid cheesy and calcified material. In neither of these cases were the tonsils tuberculous.

3. A boy of twelve had been subject for several years to unaccountable febrile attacks with nausea, headache and general aching pains. Two weeks before I saw him one of these attacks was associated with transient albuminuria. There was *no history of tonsilitis*. The tonsils were, however, large and evidently diseased. Their removal was followed by immediate recovery—no return of albuminuria or fever.

4. A boy of seven had had for some months frequent, often daily, attacks of fever, accompanied by chills in the late afternoon or evening. There was marked emaciation and debility. His father, a physician, suspected tuberculosis—*no history of tonsilitis*. The tonsils, not remarkable on superficial examination, were found to be badly infected and on the day of their removal the fever disappeared. A year later, recurrence of chills and fever. On examination, it was found that a small island of lymphatic tissue which had been left had become hyperplastic. A single rather deep crypt had become infected and closed, forming a cyst containing pus. The fever disappeared upon its removal, and the boy has remained well now for nearly two years.

5. A young man of twenty-four had had in five years several attacks of sub-acute arthritis, which, at one time, was regarded as arthritis deformans. He had had hydrotherapeutic treatment at Wiesbaden and had been advised to repeat the course of baths every summer. Last summer, recurrence of the arthritis. *No history of tonsilitis*. The tonsils were, however, badly infected and since their removal last June he has been quite well. No recurrence of the arthritis.

6. Boy of eighteen; for a year, weakness, debility, slight albuminuria. *No history of tonsilitis*. The tonsils did not appear to be enlarged, and were apparently clean. On examination they were sclerotic, atrophic and filled with retained material. Removal resulted in complete recovery with disappearance of the albuminuria.

7. A young woman of twenty-three. For three years, general debility and loss of 27 pounds. Aching sensation in throat. No knowledge that she had had tonsilitis. Trace of albumin and hyaline casts in the urine. Tonsils small and apparently clean, but on examination found to be sclerotic and badly infected. Two weeks after removal the patient was much better: the urine free from albumin. Four months later the urine was still clear and the patient in excellent general condition. Eight months after this the patient reported that she had gained thirty-five pounds in weight.

8. A lady about forty-five years of age was seized last June with a rather sudden high fever and marked prostration. The condition was regarded at first as influenza. There was a well marked leucocytosis, no local symptoms—continued fever with exacerbations. The throat was rather injected; there was no tonsillar enlargement, and no complaint relative to the throat. In the absence of any evident cause for the fever, Dr. Bordley was requested to make a special examination of the tonsils, which revealed a small abscess of the left tonsil, which broke during the examination. The temperature fell almost immediately. Complete recovery followed. There were absolutely no local subjective symptoms.

9. A woman of about 35; ten years before slight haemoptosis, followed by a long continued, slight, regular evening fever, for which she had been under treatment, at a sanatorium, for tuberculosis. In the fall of 1908 there developed again an unaccountable regular slight evening rise of temperature to a point about 100° F. or a little under. Repeated physical examination revealed no local cause for the fever. There was no cough. The patient, the wife of a physician, was kept at absolute rest, in bed, in the country, for nearly six months. In the early summer of 1909 partial hemiplegia, associated with symptoms on the part of the nervous system, which suggested to her physician a possible disseminated sclerosis. An examination of the tonsils, of which there had been no complaint, showed marked disease. A thorough emptying of the infected crypts resulted in immediate disappearance of the fever and rapid improvement in the general condition and complete disappearance of all symptoms relative to the central nervous system. In the course of a month there was a slight recurrence of the fever which disappeared again on a thorough cleaning of the tonsil-

lar crypts, which had refilled. Removal of the tonsils in the fall of 1909 was followed by complete and permanent recovery.

This patient had no evidence elsewhere of arterial disease, and the cerebral symptoms have been attributed by all who followed the case to an infectious arteritis. I had seen this lady on various occasions during the fall of 1908 and the spring of 1909. I had examined her tonsils, raised the question of a possible infection, and dismissed it.

In not one of these cases was the patient aware that there was any tonsillar infection. In many, the ordinary routine examination suggested little or nothing. In all, however, the infection in faucial or pharyngeal tonsils was at the root of more or less grave general disturbances—arthritis, endocarditis, anaemia—debility, albuminuria, suspected tuberculosis, cerebral thrombosis.

Ten years ago I am sure that I should have passed over many of these cases. While the tonsils, faucial and pharyngeal, are perhaps the commonest seats of cryptic infection, the careful observer will, however, be considerably surprised to find how often in chronic conditions of debility, anaemia, arthritis, slight unaccountable persistent fever, unsuspected disease of some one of the sinuses, ethmoidal, sphenoidal, frontal, may be found, the proper treatment of which will have a striking effect upon the general health of the patient and perhaps on other local manifestations which at first glance would seem to be quite unconnected with it.

The importance of the removal of such foci in chronic deforming arthritis has been much emphasized of late, but it is not only in cases of arthritis, acute or chronic, or marked febrile disturbances, that one should look for larval infections, but also in every otherwise unaccountable condition of debility.

The discovery and removal of badly infected tonsils while the symptoms are yet but slight, may save the affected individual from a fatal endocarditis or a deforming arthritis, or a chronic nephritis. The early detection and treatment of interstitial gingivitis may not only save the teeth, but may perhaps, if we are to believe the teachings of Hunter, prevent the development of a fatal Addisonian anaemia.

The cursory consideration of this phase of sepsis and antisepsis in internal medicine leads us to realization of how much truth there was in the observation of our English colleague of whom I have spoken. There *is* an immense amount of sepsis in medicine, and one of the most important of our duties is to suspect it, to seek for it, and not to tire until we have found it. If we search conscientiously we shall find it, sometimes, where we least expect it, and in so doing we shall perform another of the great prophylactic duties of our art.

Let us emulate our colleague, the surgeon, in our methods of antisepsis in relation to contagious diseases in the broadest sense of the word, and let us further recognize the frequency with which small foci of infection are responsible for grave general symptoms, and the importance of their early recognition and elimination.

Principiis obsta, sero medicina paratur.

THE SEWERAGE SYSTEM OF THE CITY OF BALTIMORE.[1]

By Calvin W. Hendrick,

Chief Engineer of the Sewerage Commission, Baltimore.

The sewerage system is about half completed, and we are within our estimated time and cost.

We will begin the actual use of the sewerage system the latter part of this summer, by beginning to connect up houses in East Baltimore along the high level interceptor.

There is one fact I would like to impress on the citizens of Baltimore, viz.: that the present $10,000,000 sewerage loan was voted on and passed before the present Sewerage Commission came into existence. The present Commission, therefore, is not responsible for having to ask for an additional loan. We have never made but one estimate or one statement as to cost and time of completion, as outlined in our 1907 report, as follows:

> With the aid of the information now at hand, I feel safe in saying that the cost of the sanitary sewers outlined in the Commission's Report for 1906 will be about $14,000,000, based upon present prices and the assumption that it will be possible to push the work vigorously. If for any reason the work should be delayed, an increased allowance would have to be made for salaries, office rent and other expenses. If the work is vigorously prosecuted, it is believed that the sanitary sewers as laid out in the Commission's Report for 1906 can be fully completed by the year 1914. The entire storm-water system, as outlined in the Commission's Report for 1906, can probably be constructed for about $4,500,000.

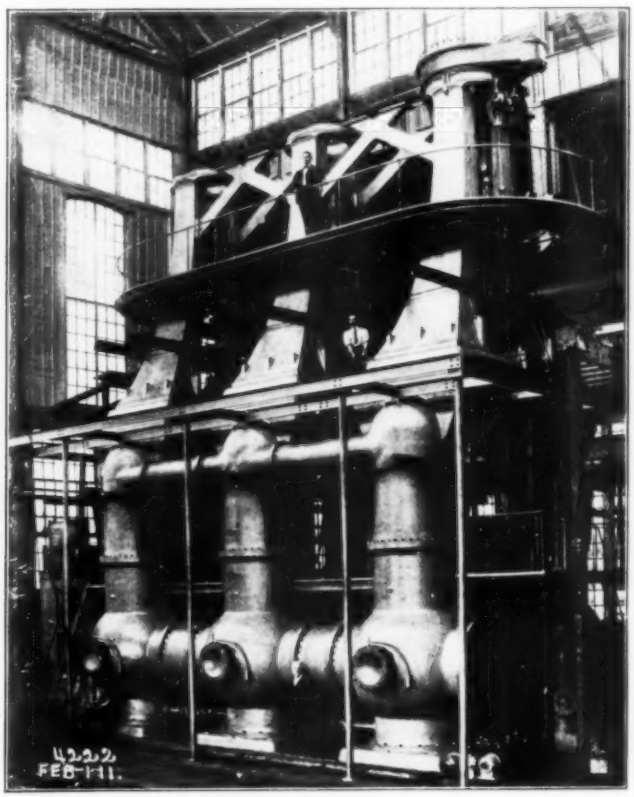
On account of the low rate of interest paid on the bonds, the city was obliged to sell the first loan at $516,529.83 less than its face value, leaving only $9,483,470.17 available for the work.

Unless one takes the time to visit in person some of the construction work being carried on in various parts of the city by the Sewerage Commission, you cannot realize the magnitude of the work nor the diversified engineering problems that are being solved every day. The people outside of Baltimore seem to appreciate this more than do the citizens of Baltimore, from the fact that we have more visitors from outside (some having traveled thousands of miles), than we have from the people living in Baltimore. These foreign visitors are not the merely idle or curious, but are citizens of consequence and engineers who are doing things throughout the world.

[1] Notes of a paper read before The Johns Hopkins Hospital Medical Society, October 16, 1911.

VIEW FROM WATER TOWER OF HYDROLYTIC AND SLUDGE DIGESTING TANKS, AND SPRINKLING FILTERS WITH SETTLING BASINS SHOWN IN THE DISTANCE BACK RIVER DISPOSAL WORKS

AUTOS IN OUTFALL SEWER AT JUNCTION OF THE HIGH LEVEL INTERCEPTOR AND THE FORCE-MAIN SEWER



ONE OF THE FIVE 27,500,000 GALLON PUMPING ENGINES, No. 1

Our work is most interesting on account of its complications. I will endeavor to give you a slight idea of its magnitude and difficulties. We will start on the supposition that water must flow down hill. This means that an 8-inch sewer, beginning at Forest Park, 13 miles distant from the disposal plant, must continue on a constantly falling grade, which cannot be flattened beyond certain rates, ever increasing in size as sewers lead into it from valleys and hills covering an area of 32 square miles, in its path, crossing Peck's Branch, the B. & O. tunnel, over and under Jones' Falls, the Pennsylvania tunnels, crossing over ravines, swinging around hills, tunneling through ridges, passing through narrow alleys, by the side of tall buildings, ever continuing on the constant falling grade; ever increasing in size until, on reaching the disposal plant, it is large enough to contain two automobiles, one on top of the other.

Two-thirds of the sewage of the city is intercepted and carried to the disposal plant by gravity; the other third is lifted by enormous pumps, each with a capacity of 27,500,000 gallons a day, from a point 13 feet below tide to the outfall sewer, a height of 72 feet (including friction), an unusually heavy lift, especially as sewage is much more difficult to pump than water. Three of these enormous pumps are constructed and are now being installed. The pumping station is large enough for two more, to be installed later. The foundations for these pumps have been so constructed, independent of the foundations for the building, as to absorb all shocks.

The difficulty of our work is doubled on account of having to construct two systems of sewers and drains, crossing and re-crossing each other in a thousand different places. The reason for the necessity of having to construct two systems is that the legislature requires every gallon of sewage to be taken into the sanitary system, to be purified before discharging it into the Chesapeake Bay or its tributaries. It is therefore of the utmost importance that we reduce the amount of sewage to be pumped and treated to a minimum, in order to keep down the size of the sewers, the pumping plant, the disposal plant, and the unnecessary constant treating and pumping of clean rain-water. To attempt to treat all the rain that falls would break a city. Therefore, the sanitary sewers will take care of the drainage from bath tubs, kitchen sinks and toilets, the rain-water will pass off through the storm-water drains, by inlets at the corners.

Now, to attempt to install these two systems of drains and sewers in the beds of streets of a city over a hundred years old, in which a mass of pipes have been laid, but in which practically no space for sewers or drains has been left, brings us face to face with a serious problem, and these sewers and drains must continue on ever-descending, regular grades and cannot twist over and under obstructions like water pipes, gas pipes and other public structures.

If the sewers could be laid in the streets it would simplify matters, but as far as we can we are attempting to lay them in the alleys, which are very narrow. Unless you have had experience in building a sewer in a narrow alley, having a constant surface flow from kitchen sinks and bath tubs, lined with old brick buildings on shallow foundations, in bad condition, with leaking water pipes and sewers under the surface, you cannot realize the difficulties we have to overcome. In the low section around the harbor the troubles are even greater, as the sewers are below tide level.

The constant accumulation of ice in these alleys, caused by this surface flow, will be entirely eliminated when the sanitary sewers are constructed. The constant trickling flow in cold weather causes a rapid accumulation of ice.

The city is getting its sewers constructed for almost cost, on account of the wholesale prices secured by the manner in which we have extensively advertised and let the contracts, doing a great part of the work by machinery, which is the proper way to get low prices.

There has been completed, the outfall sewer, extending from Chase and Durham Streets to the disposal plant at Back River; the high level interceptor to Jones' Falls; the Jones' Falls sanitary interceptor, paralleling the east side of Jones' Falls, passing under the new Union Station, and crossing Jones' Falls at North Avenue, extending through McMechen and Laurens Streets to Druid Hill Avenue; the force-mains and the force-main sewer, from the outfall sewer to the pumping station at Eastern and East Falls Avenues; the east low level interceptor, from the pumping station to Boston and Hudson Streets; the west low level interceptor, from the pumping station through President, Pratt, Light, Hill, Sharp, Ostend and Warner Streets to Alluvion Street. The majority of the sanitary laterals in East Baltimore have been laid in the streets to the curb lines. The pumping station is practically completed, with the roof on, and the chimney half way up. The interceptors and pumping station are built for a million people.

In addition, a disposal plant and sanitary system is in operation covering a large part of Walbrook. Another disposal plant, with trunk sewers, covering a large section in the northwestern part of the city, is in operation.

The sewers completed and under contract, about 160 miles, if placed end to end would almost reach from Baltimore to New York, a portion of which are large enough to drive through in automobiles.

The Sewerage Commission will extend the sewer connections up to the property or building line, either front or rear, making the expense to the property holder of connecting up with the sewerage system a small one.

I feel safe in stating that the entire built-up portion of the city will be completely sewered and in operation in 1914, the time originally stated, provided we are allowed to continue in the rapid manner we have so far prosecuted the work.

The public has little conception of the extensive and urgent relief the installation of the storm-water drains is bringing to the city by preventing flooding, eliminating thousands of objectionable cross gutters, improvement of property, etc. If the present Commission had done nothing more than bring about the improvements caused by the building of the storm-water drains and the covering in of Jones' Falls, eliminating this great nuisance, it would have performed a great and lasting

service to the city. But the storm-water proposition is only a side issue compared to the sewering of the city.

The disposal plant is constructed on the unit system, in order that it may be added to as the sewers are gradually extended. The number of units at present drawing to completion are sufficient to purify the sewage of about 275,000 people, or that portion of the city which will be sewered under the present loan.

The method of treating the sewage is as follows:

At the mouth of the outfall sewer will be installed screens that will catch such things as sticks, rags, etc., which will be removed and burned. The sewage will then pass through the meter house, which will measure its flow; then through hydrolytic tanks, about 450 feet long, requiring 8 hours for passage, a sufficient length of time to allow the solids to settle, the liquid passing on to an intercepting channel, to and through what we call the gate-house which distributes it to the stone sprinkling filters, located at a level 15 feet below the hydrolytic tanks, giving a hydraulic head of sufficient force to spray the sewage over these stone beds through nozzles or jets, spaced 15 feet apart. The hydraulic head will be controlled by butterfly valves, causing the sprays to rise and fall, varying from close to the nozzles out to the limit of 15 feet, thus utilizing the entire surface of the stone bed, a large portion of which would be wasted if the sprays were stationary. These nozzles will throw a square spray, thereby saving additional space which would be lost if the sprays were circular, as you know where circles touch there is a lost triangle.

The spraying of the sewage through the air is essential to the aeration and purification of the sewage. As the sewage falls on these beds it trickles down through 8½ feet of broken stone varying in size from 1-in. to 2½-in. The passing of the sewage through these beds forms a gelatine-like film on the stones, in which certain bacteria multiply by the million, attacking and killing the injurious bacteria in the sewage. We therefore make the bacteria do the work for us by fighting each other. The sewage on reaching the bottom of these stone beds is practically pure, and is then carried by intercepting channels leading to a central channel under the stone beds, which finally delivers the purified sewage to the settling basins, requiring three hours to pass through. These settling basins are not for the purpose of causing additional purification, but to clarify the fluid, as there are certain mineral substances in the sewage which the bacteria do not annihilate, such as is found in the Mississippi River water, which is muddy but not injurious to drink. The sewage then passes with a drop of 18 feet through the power house, in which turbines are placed, operated by the flow of the sewage. They in turn run dynamos which generate electricity, giving us power to light the plant, run the sludge pumps and lift the clarified sewage to a water tower for flushing purposes.

In other words, by the simple gravity flow of the sewage it is purified, and power is obtained to light and run the plant at practically no cost.

It all comes down to the fact that we are getting nearer to the laws of God than ever before, which laws man cannot improve on, but can only strive to follow. For instance:

The pumps lifting the sewage from the low level to the outfall sewer, is the sun drawing the salt water from the sea to the cloud; the flow of the sewage through the outfall sewer to the disposal plant, is the cloud drifting through the air; the spraying of the sewage over the stone beds is the rain falling from the cloud to the earth; the trickling of the sewage down through the stones is the rain sinking into the earth; the purified sewage coming out into the settling basins is the spring water bubbling out of the ground, and the electric light produced by the flow of the sewage is the sunshine after the clouds have passed.

NOTES AND NEWS.

Dr. Walter A. Baetjer is Acting Resident Physician, Bay View Hospital, Baltimore.

Dr. Montague Boyd is Clinical Assistant in Surgery, Atlanta College of Physicians and Surgeons, and Andrologist, The Wesley Memorial Hospital, Atlanta, Ga.

Dr. J. R. B. Branch is Attending Gynecologist to the Macon Hospital and Instructor in Gynecology and Obstetrics, the Macon Hospital Training School for Nurses. Address: 673 Cherry Street, Macon, Ga.

Dr. John R. Caulk is Instructor in Genito-Urinary Surgery, Washington University, Associate Genito-Urinary Surgeon to Mullanphy Hospital and Genito-Urinary Surgeon to Bethesda Hospital. Address: Humboldt Building, St. Louis, Mo.

Dr. T. Wood Clark is Attending Pediatrist, Faxton Hospital, Utica, N. Y. Address: 240 Genesee Street, Utica, N. Y.

Dr. Calvin D. Cowles, Jr., is Captain Medical Corps, U. S. A. Address: West Point, N. Y.

Dr. Ernest S. Cross is Physician in Charge, Aiken Cottage Sanatorium, Aiken, S. C.

Dr. J. McPheeters Glasgow is Professor of Materia Medica and Therapeutics, Medical Department of Vanderbilt University, and Visiting Surgeon to St. Thomas Hospital. Address: The Worthington, Nashville, Tenn.

Dr. Robert L. Cunningham is Instructor in Clinical Medicine, Los Angeles Medical Department, University of California, Chief of Medical Clinic, Selwyn Emmett Graves Dispensary, Attending Physician, Los Angeles County Hospital and Attending Physician, Barlow Sanitarium, Los Angeles, California.

Dr. Joseph Erlanger is Professor of Physiology, Washington University, St. Louis, Mo.

Dr. W. L. Estes, Jr., is Chief of Staff, St. Luke's Hospital, South Bethlehem, Pa.

Dr. F. Webb Griffith is Surgeon to the Biltmore Hospital, Asheville, N. C.

Dr. Runkle F. Hegeman is a member of the Staff of the New York Foundling Hospital, New York City.

Dr. Charles W. Hennington is Assistant on the Staff of the City Hospital and Surgeon to the Rochester State Hospital, Rochester, N. Y.

Dr. W. H. Higgins is Instructor in Clinical Medicine, University College of Medicine, Richmond, Va. Address: 101 W. Grace Street, Richmond, Va.

Dr. Gerry R. Holden is Gynecologist to St. Lukes Hospital, Jacksonville, Fla. and Gynecologist to the Florida State Hospital, Chattahoochee, Florida. Address: 215 Laura Street, Jacksonville, Fla.

Dr. J. Gardner Hopkins is Assistant in Clinical Pathology, Columbia University, Bacteriologist, St. Luke's Hospital, and Pathologist, Sloane Hospital for Women. Address: 350 Washington Avenue, Brooklyn, N. Y.

Dr. Henry M. Hurd has resigned his position as Superintendent of the Johns Hopkins Hospital, and has been appointed Secretary to the Board of Trustees.

Dr. Henry T. Hutchins is Fellow in Gynecology, The Harvard Medical School, Surgeon to Out Patients, The Free Hospital for Women, Brookline, Mass., and Consulting Gynecologist to the Rufus S. Frost Hospital, Chelsea, Mass., and to the Memorial Hospital, Pawtucket, R. I. Address: 374 Marlborough Street, Boston, Mass.

Dr. Clarence B. Ingraham is Instructor in Obstetrics and Clinical Assistant to the Gynecological Department, University of Colorado, and Obstetrician to St. Luke's Hospital, Denver. Address: 1405 Glenarm Place, Denver, Colo.

Dr. C. R. Kingsley is Pathologist and Dispensary Physician, S. R. Smith Infirmary, Staten Island, and Pathologist, St. Vincent's Hospital, Staten Island. Address: 305 Jewett Avenue, West New Brighton, N. Y.

Dr. Irwing P. Lyon is Lecturer on Clinical Medicine, University of Buffalo, Librarian, Medical Department, University of Buffalo, Assistant Attending Physician, Buffalo General Hospital, and Consulting Physician, Dispensary for Tuberculosis, Charity Organization Society.

Dr. W. G. MacCallum is Director of the Pathological Department, Presbyterian Hospital, New York.

Dr. J. D. Madison is Professor of Medicine, Wisconsin College of Physicians and Surgeons, and Attending Physician to the Milwaukee County Hospital and St. Joseph's Hospital.

Dr. E. M. Mason is Pathologist to the Hillman Hospital and Physician to the Jefferson County Anti-Tuberculosis Camp and Dispensary. Address: Empire Building, Birmingham, Ala.

Dr. G. Brown Miller is Associate in Gynecology, the George Washington University, Gynecologist to the Garfield and Emergency Hospitals, and Associate Gynecologist to the Columbia Hospital and to the George Washington University Hospital, Washington, D. C.

Dr. Roger S. Morris is Associate Professor of Medicine, Washington University Medical School, St. Louis, Mo.

Dr. Douglas H. Morse is Resident Pathologist, Washington University Hospital, Saint Louis, Mo.

Dr. Charles C. Norris is Instructor in Gynecology, University of Pennsylvania, Attending Physician to the Maternity Hospital, and Assistant Gynecologist and Obstetrician to the Philadelphia General Hospital. Address: 1503 Locust Street, Philadelphia, Pa.

Dr. Francis W. Peabody is Assistant Resident Physician, Hospital of the Rockefeller Institute, New York City.

Dr. Frederick S. Ray is Clinical Assistant in Surgery, Los Angeles Department, College of Medicine, University of California. Address: 121 N. Union Avenue, Los Angeles, Cal.

Dr. E. H. Richardson is Visiting Physician to the Union Protestant Infirmary, the Church Home and Infirmary and the City Hospital at Bay View.

Dr. Thedore F. Riggs is Attending Surgeon, St. Mary's Hospital, Pierre, S. D., and Visiting Surgeon, Onida Hospital, Onida, S. D.

Dr. Stephen Rushmore has been appointed Consulting Gynecologist to the Symmes Arlington Hospital, Arlington, Mass. Address: 407 Marlborough Street, Boston, Mass.

Dr. S. W. Schaefer is on the Gynecological Staff of the Multnomah County Hospital, and Clinical Attendant in Surgery, the Free Dispensary. Address: 1022 Selling Building, Portland, Oregon.

Dr. John A. Sampson is Professor of Gynecology, Albany Medical College, and Gynecologist to the Albany Hospital and South End Dispensary.

Dr. Benjamin R. Schenck is Junior Attending Gynecologist, Harper Hospital, and Consulting Obstetrician, Woman's Hospital, Detroit, Mich.

Dr. Laurence Selling is Voluntary Assistant in the Königliche Psychiatrische und Nervenklinik, Breslau, Germany.

Dr. W. T. Shallenberger is Assistant in Clinical Gynecology and Obstetrics, Atlanta College of Physicians and Surgeons and Chief of Cystoscopic Clinic, Florence Crittenton Home, Atlanta, Ga.

Dr. Joseph T. Smith is Assistant Gynecologist, Lakeside Hospital Dispensary. Address: 628 Rose Building, Cleveland, Ohio.

Dr. Winford H. Smith is Superintendent of the Johns Hopkins Hospital.

Dr. Harvey B. Stone is Professor of Surgery, the Baltimore Medical School and member of the Staff of the Church Home and Infirmary.

Dr. S. A. Strouse is Associate Pathologist, Michael Reese Hospital, Chicago. Address: 3914 Ellis Avenue, Chicago, Ill.

Dr. Douglas Vanderhoof is a member of the Adjunct Faculty, Medical College of Virginia, Attending Physician to the Memorial Hospital and Consulting Physician to the Johnston-Willis Sanatorium, Richmond, Va.

Dr. Louis M. Warfield is Assistant Professor of Medicine, College of Physicians and Surgeons, Milwaukee, and Assistant Professor of Pathology, Marquette University Medical Department, Milwaukee, Wis.

Dr. Otis B. Wight is Adjunct in Gynecology, Medical Department, University of Oregon. Address: 608 Medical Building, Portland, Ore.

Dr. Gordon Wilson is Professor of Clinical Medicine, the University of Maryland, Baltimore, Md.

ARMY MEDICAL CORPS EXAMINATIONS.

The Surgeon General of the Army announces that preliminary examinations for the appointment of first lieutenants in the Army Medical Corps will be held on January 15, 1812, at points to be hereafter designated.

Full information concerning these examinations can be procured upon application to the "Surgeon General, U. S. Army, Washington, D. C." The essential requirements to securing an invitation are that the applicant shall be a citizen of the United States, shall be between 22 and 30 years of age, a graduate of a medical school legally authorized to confer the degree of doctor of medicine, shall be of good moral character and habits, and shall have had at least one year's hospital training as an interne, after graduation. The examinations will be held concurrently throughout the country at points where boards can be convened. Due consideration will be given to localities from which applications are received, in order to lessen the traveling expenses of applicants as much as possible.

The examination in subjects of general education (mathematics, geography, history, general literature, and Latin) may be omitted in the case of applicants holding diplomas from reputable literary or scientific colleges, normal schools or high schools, or graduates of medical schools which require an entrance examination satisfactory to the faculty of the Army Medical School.

In order to perfect all necessary arrangements for the examination, applications must be complete and in possession of the Adjutant General at least three weeks before the date of examination. Early attention is therefore enjoined upon all intending applicants. There are at present sixty-four vacancies in the Medical Corps of the Army.

NOTES ON NEW BOOKS.

International Clinics, Vol. II, Twenty-first Series. 1911. Price $2.00. (*Philadelphia and London: J. B. Lippincott Company.*)

Mobility and Malpositions of the Heart by Satterthwaite, Chronic Cystitis in Women by Beyea, Diseases Produced by B. Coli Communis by Tuбck, The Progress of the Tuberculosis Campaign in Pennsylvania up to 1911 by Flick and The Cultivation of Medicinal Plants by Alice Herkel are some of the many interesting papers in this volume. The variety of the articles makes the "Clinics" welcome to a large body of general practitioners who can find both amusement and information in them.

The Care of the Baby. By J. P. Crozer Griffith, M. D., Clinical Professor of Diseases of Children in the University of Pennsylvania. Fifth Revised Edition. Illustrated. $1.50. (*Philadelphia and London: W. B. Saunders Company, 1911.*)

This book is so well known, and has proven so satisfactory to the profession and laity for more than fifteen years that this last edition needs no more than a mere word of welcome which we gladly offer it. It is a pleasure to see a book pass through numerous editions, as this at once stamps it as superior.

A Manual of Diseases of Infants and Children. By John Ruhräh, M. D., Clinical Professor of Diseases of Children, College of Physicians and Surgeons, Baltimore. Third Revised Edition. Illustrated. $2.50. (*Philadelphia and London: W. B. Saunders Company, 1911.*)

This excellent little manual requires no commendation from us. It has already proved its value, and in its revised form will undoubtedly be even more welcome than its predecessors. The author has been conscientious in his revision, and the book has been bettered. Many of the illustrations are excellent, others less good and poorly reproduced so that they do not stand out sharply. In the next edition we hope they will all be as good as the best.

A Text-Book of Medicine. By Dr. Adolf v. Strümpell. Edited by Herman F. Vickery and Philip Coombs Knapp. Two volumes. (*New York and London: D. Appleton & Co., 1911.*)

When a work has gone through seventeen editions there seems at first little for the reviewer to do beyond noting this fact and uttering a few platitudes. However, in this case it seemed worth while to do otherwise and make more than a cursory examination. The present is the fourth American edition and is edited by Drs. Vickery and Knapp of Boston. The work is in two volumes, which is certainly an advantage as the one volume modern text-book of medicine has grown to so great a size as to be difficult to handle. The two volume arrangement gives the opportunity of adding a section on mental diseases, which adds to its value. In general this work of Strümpell is a noteworthy one and has long held a foremost place among the text-books of the world. The descriptions of disease are clear and concise throughout with a proper balance held as to the amount of space given to each department. The section on diseases of the nervous system is particularly good and is fuller than in the majority of text-books.

The general character of the work being of the highest it is well to turn to a more special examination to find how accurately it has been brought up to date. There is room for a considerable criticism here and it is evident that Professor Strümpell does not keep up with modern literature. The section on the results of attempts to convey typhoid fever to animals takes no account of work for nearly ten years past and the successful results with monkeys are quite ignored. The discussion of typhoid perforation is wholly inadequate. For a modern work to advise the administration of opium as the main treatment of intestinal perforation in typhoid fever is disgraceful—there is no other word. The surgical treatment gets a line and a half and the statement that "experience of this is scanty" is not correct. There is very little attention devoted to the prophylaxis of typhoid fever and the statements about the results of vaccination ("have not led to any definite results") might have been sufficient some years ago but are not true to-day—this edition is dated 1911. Then on page 115, that miserable designation of Typho-Malarial Fever is brought in, for which the American editors are apparently responsible. Surely it is time that this term found oblivion and it is disappointing to find it perpetuated in such a work as this.

Under Epidemic Cerebro-Spinal Fever it is surprising to find that the work of Flexner is apparently quite unknown to the author both as regards the animal work and the serum. The editors might have been expected to correct this but they give only a very brief note of the results of the use of Flexner's serum without any mention of the method of its employment. This seems a serious omission. One always turns with interest to the discussion of the treatment of appendicitis. Of course there is much difference of opinion regarding this but it is disappointing to find so much stress laid on the giving of opium. The discussion of operation deals a good deal with the question of abscess formation and this quotation throws considerable light on the views held: "The physician must ask himself every minute whether further symptomatic treatment is permissible, or whether it may not be necessary to have the abscess opened by surgical interference." This is in the general discussion and not in reference to the treatment of cases with abscess. The rules given for operation do not seem very satisfactory, for example to place much reliance on elevation of temperature as an indication does not seem good practice when we remember that many of the most dangerous cases have little or no fever. The cases with early gangrene or perforation do not receive proper discussion and yet they are the most serious.

While we regard this text-book as one of the best, yet it is very evident from the few special points which were chosen for examination that the present edition cannot be regarded as having been brought up to date. There are many serious omissions which lessen its value. Professor Strümpell might be expected to have noted some of them but, whether or not, it seems reasonable to consider that the editors should have gone more carefully over recent work, particularly in American medicine.

Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India.

No. 43 (New Series). The Relation of Tetanus to the Hypodermic or Intramuscular Injection of Quinine. By Lieutenant-Colonel Sir D. Semple, kt., M. D., etc. Price 1/2.

No. 44 (New Series). The Preparation of a Safe and Efficient Antirabic Vaccine. By Lieutenant-Colonel Sir D. Semple, kt., M. D., etc. Price 9d.

Issued under the authority of the Government of India, by the Sanitary Commissioner with the Government of India. (*Simla-Calcutta: Superintendent Government Printing, India, 1911.*)

There is much in this series of "Scientific Memoirs" which is valuable, but many of the reports are very technical in character and can find but few readers, which is true of both the last which have just been received. Lieut.-Col. Semple's paper on the Relation of Tetanus to the Injection of Quinine would seem to have little practical value, unless it be that tetanus follows such injections more often in India than elsewhere. This can

only be due to an avoidable contamination, and the value of such a study as the author's appears problematical. His second report, like the first, is based on a series of carefully tried experiments, and is of greater importance, since rabies is a disease which may occur almost anywhere, and since all established, and proposed Pasteur institutes will be glad to have additional information as to the preparation of antirabic vaccine.

Hospital Management. A Handbook for Hospital Trustees, Superintendents, Training-School Principals, Physicians and all who are actively engaged in promoting Hospital work. Illustrated. Edited by CHARLOTTE A. AIKENS, author of "Hospital Training-School Methods and the Head Nurse," "Primary Studies for Nurses," etc. $3.00. (*Philadelphia and London: W. B. Saunders Company, 1911.*)

Miss Aikens has gathered together an interesting and instructive body of papers on hospital management written for the most part by persons who have had practical experience in the problems which arise in such institutions. As the chapters are written by individuals who had no means of knowing the contents of any papers but their own it is not strange that some repetitions are to be found and undoubtedly the vigilant care of the editor has eliminated many which might otherwise have been present.

The subjects discussed are of great importance and ought to interest every hospital officer and trustee. Take as an example the paper of Dr. Metcalf on the "Purchase and Economic Use of Surgical Supplies." Here we have careful and detailed information under the head of dressings as to gauzes, bandages, absorbent cotton, plaster of Paris, iodoform gauze, cotton sheeting, cotton wadding and adhesive plasters with directions as to the best manner of procuring or making these. In rubber goods we are told what sort of rubber gloves to purchase and how to keep them in repair; also about hot-water bags, ice bags, drainage tubing, rubber tissues and the methods of preserving them from wear and deterioration. The difficult question of stomach tubes, catheters, bulb-syringes, air-cushions and atomizers is also fully touched upon. The various forms of suture material as catgut, silkworm gut, kangaroo tendon, etc., are described. The preparation of sterile sutures is not described nor the use of silver wire sutures, which one can but regard as a serious omission. Under the head of glass-ware we have clear and sensible recommendations as to the purchase of clinical thermometers, blood-counters, cover glasses and slides. Similar detailed information is also given as to anaesthetics, disinfectant solutions, splints, crutches and the like. This chapter is an example of many other similar chapters which are equally instructive and helpful. We commend the book to all who are interested in hospitals.

Studies in Cardiac Pathology. By GEORGE W. NORRIS, M. D., Associate in Medicine at the University of Pennsylvania, etc. Illustrated. Price $5.00. (*Philadelphia and London: W. B. Saunders & Co., 1911.*)

The stimulus for this book seems to have been the opportunity of photographing cardiac lesions. There are 85 full-page illustrations. Most of these are good, others, as might be expected from photographs of objects with three dimensions, are only sharp in areas and obscured elsewhere by shadows or high lights. A poor illustration like Fig. 36 of chronic adhesive pericarditis adds nothing, especially since there are other much better illustrations of analogous conditions. Fig. 42 does not convey the idea of concentric hypertrophy, and while gummata of the myocardium are rare, four separate full-page illustrations seem too many, as there are only two poor cuts of the much more important syphilitic lesion in the aorta.

The chapter including 10 page illustrations of congenital lesions (patent ductus arteriosus, foramen ovale and interventricular septa) would be entirely superfluous were it not for Fig. 84, aortic stenosis. A picture of the collateral circulation as represented by J. F. Meckel in 1827 would be of value here.

There is no definite system in the presentation of the subject and the various phases of cardiac pathology are only more or less completely illustrated. There are no microscopic illustrations.

The photographs are all accompanied by complete original pathological descriptions. This is one of the best features of the book. The accompanying text is brief and clear. The statistics too are of value. The bibliography does not attempt to be complete. The few minor errors in plate references, etc., are unimportant.

A Manual of Pathology and Morbid Anatomy. By T. HENRY GREEN, M. D., F. R. C. P., etc. Eleventh Edition. Revised and Enlarged by W. CECIL BOSANQUET, M. D., etc. Illustrated. (*Philadelphia and New York: Lea & Febiger, 1911.*)

This book was noticed by us in our issue of January, 1906, volume XVII, and what was said of it then holds true to-day. Considering its character it has had a remarkable success, and appears to be very popular, but as a scientific accurate work on pathology it cannot be recommended.

Immune Sera. A Concise Exposition of the Main Facts and Theories of Infection and Immunity. By DR. CHARLES FREDERICK BOLDUAN. Fourth Edition. Rewritten and Enlarged. (*New York: John Wiley & Sons, 1911.*)

This is a small but first-class manual and we are glad to note its fresh appearance. Its excellent characteristics were noticed in this journal in December, 1907, volume XVIII.

A Manual of Clinical Diagnosis By Means of Laboratory Methods for Students, Hospital Physicians, and Practitioners. By CHARLES E. SIMON, M. D., etc. Seventh Edition. Enlarged and Thoroughly Revised. Illustrated. $5.00. (*Philadelphia and New York: Lea & Febiger, 1911.*)

This work has won merited esteem and each edition is an improvement on the preceding one. The character of the work was commended in the Bulletin in February, 1908, volume XIX.

Laboratory Studies in Tropical Medicine. By C. W. DANIELS, M. B. (Camb.), M. R. C. P. (Lond.), etc., and H. B. NEWHAM, M. R. C. S. (Eng.), etc. Third Edition. Thoroughly Revised. Illustrated. $4.00. (*Philadelphia: P. Blakiston's Son & Co., 1911.*)

It would be well for all doctors going to the tropics or making a study of tropical diseases to have this book on their shelves. The authors discuss in a clear and concise way the blood and its parasites of one sort and another, insects, diptera, mosquitoes, fleas, lice, bed-bugs, arachnoidea, etc., parasites in the tissues and intestines, faeces, urine, etc. These "Studies" will prove a most helpful guide for they are well written and reliable.

A Manual of Practical Hygiene for Students, Physicians and Health Officers. By CHARLES HARRINGTON, M. D. Fourth Edition. Revised and Enlarged by MARK WYMAN RICHARDSON, M. D. Illustrated. $4.50. (*Philadelphia and New York: Lea & Febiger, 1911.*)

It is to be regretted that Dr. Harrington did not live to see this new edition of his admirable work, and to continue the excellent work he was doing. Dr. Richardson is to be congratulated on his share of this new edition. The book remains, as it was before he took hold of it, one of the very best manuals on the subject

in English, and students could not have a better guide in their study of hygiene. The Manual was praised in the Bulletin in February, 1906, volume XVII.

A Manual of Surgery for Students and Physicians. By Francis T. Stewart, M. D. Second Edition. Illustrated. $4.00. (*Philadelphia: P. Blakiston's Son & Co., 1911.*)

The manuals on surgery are innumerable, and this work has no special characteristic to save it from the oblivion which is sure to fall on all but one or two within a comparatively short time. It can be recommended as a safe guide, but a student who means to make surgery his specialty will want a larger and better book than this to start out with.

Isthmian Canal Commission. A Report on Hemoglobinuric Fever in the Canal Zone. A Study of its Etiology and Treatment. By W. E. Deeks, M. D., and W. M. James, M. D. (*Published by the Department of Sanitation, I. C. C. Press, Quartermaster's Department, Mount Hope, C. Z., 1911.*)

This most interesting report should have a wide circulation, for the question of the etiology of hemoglobinuric fever has ever been one of great interest to all true students of medicine. We are especially glad to call attention to it as another bit of proof of the excellent work being done by the doctors on the Panama Canal under the able direction of Col. W. C. Gorgas.

A Cross-Section Anatomy. By Albert C. Eycleshymer, M. D., etc., and Daniel M. Schoemaker, M. D., etc. $20.00. (*New York and London: D. Appleton and Company, 1911.*)

This work is as much a credit to the publishers as to the authors, but its price will unfortunately prevent its being as much used by students as is to be desired. Its title indicates exactly the scope of the work. There are 113 plates of section drawings followed by a chapter on the "Topography of Organs," a "Bibliography" and "Index." All names are given as in the B N A. The drawings are four-fifths natural size, and on the opposite page is the explanatory text. In the introduction, which gives an interesting account of the historical development of such an anatomy as this one, the reader will also find all the detail necessary for him to have a clear understanding of these section drawings, which in this quarto edition are so large as to be easily studied. A word of commendation may be added in praise of the type which is clear and of good size.

Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India. New Series, No. 45. Epidemic Dropsy in Calcutta. By Major E. D. W. Greig, M. D., etc. 2/. (*Calcutta: Superintendent Government Printing, India, 1911.*)

"Epidemic Dropsy" is merely another name for beriberi, and the main interest of this paper lies in the fact that it is the first report on the disease as seen in Calcutta. Major Greig carried on his investigations with care and skill, and his study is a valuable contribution to the already large literature on this subject.

Nervous and Mental Disease Monograph. Series No. 8. Mental Mechanisms. By William A. White, M. D., etc. $2.00. (*New York: The Journal of Nervous and Mental Disease Publishing Company, 1911.*)

The first monograph of this series by Dr. White was a most excellent one, but as high praise cannot be accorded to this piece of work. After careful reading it leaves the impression of lack of unity, as though the chapters had been delivered as lectures on one or another occasion, and then thrown together into a volume hastily, making an inharmonious whole. There is some unnecessary repetition—cf. the dreams related on pp. 28 and 37. In spite of its imperfections this monograph should prove essentially useful to students, for the author's style is simple and clear, somewhat rare qualities among the writers on psychological subjects, who mystify the reader by their maze of words, and leave him wondering as to the real clearness of the author's mind. "Mental Mechanisms" is divided into the following eight chapters, which are preceded by a brief preface and introduction: Chap. I. Some Considerations on the Constitution of Consciousness.—Relation of Mental and Physical. Chap. II. Types of Reaction.—Defense and Compensation. Chap. III. The Content of Consciousness.—D r e a m s.—Symbolism.—The Psychoses.—Folk-Lore. Chap. IV. Types of Complex Reactions.—Modes of Expression.—General Considerations. Chap. V. Current Conceptions of Hysteria.—Psychological, Physiological, Biological and Clinical Theories. Chap. VI. The Psychological Approach to the Problem of Art. Chap. VII. The Theory, Methods, and Psychotherapeutic Value of Psychoanalysis. Chap. VIII. Preventive Principles in the Field of Mental Medicine.

All the chapters are by no means of equal merit, perhaps due in a measure to the limit of size of the monograph, but as this is a work more fitted to the student than the advanced worker, the former can perhaps gain a better foundation as to the working of the mind from the conciseness of the manual than if it were longer.

Progressive Medicine. Vol. III, Sept. 1911. (*Philadelphia and New York: Lea & Febiger, 1911.*)

The general reviews, prepared with their usual skill by the editors, in this volume cover "Diseases of the Thorax and its Viscera, Including the Heart, Lungs and Blood Vessels," "Dermatology and Syphilis," "Obstetrics," and "Diseases of the Nervous System." The report on the use of Salvarsan or "606" should be carefully read by all who have not had a chance to inform themselves thoroughly both as to the advantages and dangers of this powerful remedy.

The Human Atmosphere or The Aura made Visible by Chemical Screens. By Walter J. Kilner, B. A., M. B. (Cantab.), etc. Illustrated. (*New York: Rebman Company.*)

The author believes he has discovered a new physical phenomenon and that all beings (human) have aura; that these aura change under varying conditions and that diseases can be diagnosed from the changes occuring in the aura. As the aura can only be seen under special conditions, and even then not without some strain and danger to the eyes, the author does not succeed in convincing us of having made a real discovery, and of not being self-deceived. It will require much longer and profounder investigation into the subject before the truth and value, if true, of this discovery(?) can be affirmed.

Oxford Medical Publications. The Sensibility of the Alimentary Canal. By Arthur F. Hertz, M. A., M. D. (Oxon.), F. R. C. P. (*London: Henry Frowde and Hodder & Stoughton, 1911.*)

In a small, nicely printed, and neat-looking volume, Dr. Hertz has reprinted the lectures he delivered this year under the Goulstonian Foundation at the Royal College of Physicians. He treats the subject in an interesting way, and his results are based in large measure on his own experiments. The final word has not yet been spoken, however, and Dr. Hertz leaves some points in rather a cloudy condition. He states that "the mucous membrane of the œsophagus is sensitive to thermal stimulation, but that of the stomach and intestines is insensitive," and in the next paragraph that "contact of alcohol with the mucous membrane of all parts of the alimentary canal gives rise to a sen-

sation of heat." The difference between this sensation of heat, and the lack of sensitiveness of the stomach to thermal stimulation is not sufficiently explained.

An Introduction to Therapeutic Inoculation. By DR. W. CARMALT JONES, M. D. (Oxon.). $1.25. (*London: Macmillan & Co., Ltd., 1911.*)

This little book of one hundred and sixty-five pages is divided into two parts and an appendix. According to the preface, the first part is "an attempt to state in the simplest possible terms, the common sense of Therapeutic Inoculation, the object of which is to induce immunity to bacterial infection. The second part deals with the practical application of the principles" stated.

The book is characterized by inaccurate statements, extravagant claims and gross insufficiencies. For example, on page seventeen the statement is made that "Typhoid Fever, Cholera and Plague are the only diseases against which prophylactic inoculation is used to any extent at the present time." No mention is made of vaccination against smallpox except under the historical section, fifty-seven pages further on. Again on page thirty-one, the dogmatic assertion is made that "all infections due to organisms of these types (pathogenic) are amenable to treatment by vaccines." The fact that in many bacterial diseases such as typhoid fever, pneumonia, etc., the results are at best uncertain, and that in infectious endocarditis vaccine therapy may prove most harmful, finds no mention.

The classification of bacteria on page thirty-two is to say the least naïve; the description of making blood cultures is primitive and faulty; and the diagnosis of the specific infecting organism from clinical sizes alone, recommended in Chapter III, need only be mentioned to be condemned.

In the description of the technique of agglutination tests, no mention is made that the serum must be diluted. On page fifty, we find that "the opsonic index . . . . is by far the best method which is at present available for the serum diagnosis of the majority of bacterial diseases!"

The chapter on the history of therapeutic inoculation is perhaps the best one in the book though it contains not a single reference to Ehrlich and his work.

Part II, devoted to the practice of vaccine therapy is more satisfactory than Part I, but here, too, broad generalizations are drawn from meager data and though we are told in the preface that "only those infections of which there has been large experience are considered," we find statistics of the effect of vaccines in a small series of cases of whooping cough!

In the appendix there are good, though general descriptions of laboratory methods and on the preparation of vaccines.

Throughout the book, errors of rhetoric and a careless use of grammar abound. Though it contains good material the book is too elementary for students and too inaccurate to be of any great utility to anyone.

Vaginal Celiotomy. By S. WYLLIS BANDLER, M. D., Adjunct Professor of Diseases of Women, New York Post-Graduate Medical School and Hospital. $5.00. (*Philadelphia and London: W. B. Saunders Company, 1911.*)

This work supplies most acceptably a need that has long been felt in the gynecological literature of this country. The author has wisely avoided extravagant claims for vaginal celiotomy as compared with the abdominal route, and, on the whole, has shown good judgment in the selection of operations for which it undoubtedly possesses distinct advantages. The illustrations are exceptionally good; and while there is an unnecessary repetition in the portrayal of certain operative steps, this is offset by the obvious advantage to the student of having each operation fully and clearly presented without the inconvenience of having to refer to other sections. The text is not intended as an exhaustive treatise, but emphasizes the essentials in a very forceful and suggestive style. If any criticism is to be made of the book, it should be in the form of a warning to the beginner that the difficulties attending vaginal celiotomy in a large percentage of cases are far greater than one would suppose from a review of this volume. Nevertheless, the work deserves the hearty endorsement of the profession, and will undoubtedly aid very materially in bringing into general favor procedures the value of which has already remained far too long unrecognized by the mass of gynecologists in this country.

E. H. R.

Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India.

No. 46 (New Series). Malaria in the Punjab. By MAJOR S. R. CHRISTOPHERS, M. B., etc. Price 3/.

No. 47 (New Series). Dysentery and Liver Abscess in Bombay. Being the Report of an Enquiry carried out by MAJOR E. D. W. GREIG, M. D., etc., and CAPTAIN R. T. WELLS, M. B., etc. Price 3/. (*Calcutta: Superintendent Government Printing, India, 1911.*)

Without access to these reports which are "issued under the authority of the Government of India by the Sanitary Commissioner with the Government of India, Simla, no student of these diseases can feel himself fully master of his subject. Both diseases are very prevalent in India, and there seem to be certain local conditions in the Punjab which make epidemic or autumnal malaria in that country extremely fatal and especially so to children and babies. Happily in America there is no place where such devastating epidemics occur. Even yellow fever at its worst in Cuba can hardly have been so fatal as the autumnal malaria appears to be regularly in the Punjab. Major Christopher's report will only be read by a few specialists probably but they will find it eminently worth careful study.

The report of the two officers Greig and Wells will interest a larger body of physicians for amoebic dysentery is a commoner disease than is generally supposed in this country, and this careful study will help any student in the study of an obscure case of dysentery.

The Mechanism of Life. By DR. STÉPHANE LEDUC. Translated by W. DEANE BUTCHER. Price $2.00. (*New York: Rebman Company, 1911.*)

This is a work which all students of biology will be glad to have a chance to read, but it is only the specialist who can judge of the correctness of the author's views and facts. In 1907 the Academy of Sciences in Paris declined to publish a report of these experiments because the author appeared to be tending toward "spontaneous generation" as the basis of his psycho-chemical theory of life. The table of contents will indicate the difficulty of the solution of the problem of the mechanism of life, and the brevity of the work will weigh somewhat against its value in view of the different questions which have first to be solved. The chapters are headed as follows: (1) Life and Living Beings; (2) Solutions; (3) Electrolytic Solutions; (4) Colloids; (5) Diffusion and Osmosis; (6) Periodicity; (7) Cohesion and Crystallization; (8) Karyokinesis; (9) Energetics; (10) Synthetic Biology; (11) Osmotic Growth: A Study in Morphogenesis; (12) The Phenomena of Life and Osmotic Productions: A Study in Physiogenesis; and (13) Evolution and Spontaneous Generation.

Principles of Anatomy. The Abdomen Proper Described and Illustrated by Text and Plates by WM. CUTHBERT MORTON, M. A., M. D. (Edin.). Price $12.00. (*New York: Rebman Company, 1911.*)

The cost of this work will limit its use greatly among medical students, and the difficulty of the combined use of the plates and text will not render it popular. It will have also to contend with

the well earned popularity of Gray and other first-class anatomies. Thus handicapped it will have difficulty in making its way, but the students who will work through it plate by plate and layer by layer will undoubtedly know the anatomy of the abdomen thoroughly, though this knowledge, tough as it is, can we believe be more readily and better acquired elsewhere and by other methods.

What to Eat and Why. By G. Carroll Smith, M. D. $2.50. (*Philadelphia and London: W. B. Saunders Company, 1911.*)

The value of this work rests largely in its simplicity, and yet, so far as the author goes, thoroughness. It is a good book for students and for the laity—though where regular diets have to be prescribed it is far better for the patient to take the advice of a physician than to follow any book absolutely. The author begins with an introductory chapter on foods and digestion, and then in the succeeding chapters takes up special diseases and explains in a rational manner the diets best suited to each. There are many more extensive and pretentious works on this same subject, but this one will serve its readers as a safe guide.

Cesare Lombroso. A Modern Man of Science. By Hans Kurella, M. D. Translated from the German by M. Eden Paul, M. D. (*New York: Rebman Company, 1911.*)

Dr. Kurella's study of Lombroso and his work is both interesting and sympathetic. To those unable to read Italian this brief sketch of a great man will be welcome. How great the man was is known to but a few, for most associate his name alone with his work on marks of degeneracy in the human race and their association with crime, and the majority of readers have a very false idea of what Lombroso's final ideas about this relation was. Few recognize that he was the first to study pellagra thoroughly, and that he was hounded by the profession for the utterance of his views as to its cause, and driven from Pavia where he was practising. To-day his intoxication theory is the one most generally accepted by the leading authorities on this disease. Lombroso did not give in to the attacks upon him, but quietly pursued his way and before he died the merit of his work happily was known. But in the study of criminal anthropology and psychology, wrong as some of his views may be, he will always have to be recognized as a leader, for his work was most thorough and exhaustive and it is due to him that criminology has become such an important study to-day in the solution of questions connected with social economy and welfare. The criminal owes much of his better treatment to Lombroso's teachings. Towards the end of his life he turned to the study of spiritualism and believed in it; his own attitude is well worth quoting: "Every epoch is unripe for the discoveries which have had few precursors; and if it is unripe it is also unadapted to perceive its own incapacity. The repetition of the same discovery prepares the brain to make it its own, to accept it, and finds minds gradually becoming less hostile to its acceptance. For nearly twenty years the discovery of the cause of pellagra was regarded throughout Italy as mad; to-day the academic world still laughs at criminal anthropology, at hypnotism, at homeopathy. Who knows whether we, who to-day laugh at spiritualism, may not also be in error? Thanks to the misoneism which is concealed in us, we are, as it were, hypnotized against the new ideas, incapable of understanding that we are in error, and like many insane persons, whilst the darkness hides the truth from us, we laugh at those who stand in the light." Although this was written in 1883, it explains clearly his later activities in regard to spiritualism, and shows his open-mindedness and breadth of view. Kurella, who is an ardent admirer of his teacher and friend, ends this life with a singularly unfortunate phrase. Speaking of Lombroso's last work on hypnotism and spiritualism he says: "We, however, who renounce the 'Spirit-World,' may well content ourselves with the undying intellectual achievements of the deceased investigator; to our enemies we freely give the Lombroso of *senile decay* [the *italics* are ours], for the Lombroso of youth, forever young, is ours." The phrase *italicized* is unkind to say the least, for there are many who believe in the "Spirit-World," who give no sign of senile decay, and it seems to us that Lombroso's attitude as evidenced in his own words quoted above should have kept the author from such a sneer. Otherwise there is no fault to be found with the book, the translation is smooth, and it is fortunate that such a clear exposition of Lombroso's work should be attainable by all occupied in the study of criminology.

A Pocket Medical Dictionary. By George M. Gould, A. M., M. D., etc. Sixth Edition. Revised and Enlarged. $1.00. (*Philadelphia: P. Blakiston's Son & Co., 1911.*)

Dr. Gould's reputation as a lexicographer has long been well established and all his dictionaries are books of distinguished merit. There is no doubt that this is the best pocket medical dictionary in English. The new edition contains 34,000 words, is readily portable, the type is clear, and its price brings it within the reach of all students. It is a most useful book for any physician to have close at hand.

Surgical Applied Anatomy. By Sir Frederick Treves, Bart., etc. Sixth Edition. Revised by Arthur Keith, M. D., etc. Illustrated. (*Philadelphia and New York: Lea & Febiger, 1911.*)

This has long been a deservedly popular work with students, and will, there is little doubt, long remain so. The common power of the great English clinicians, so rare among most medical writers, of presenting their subject in an attractive and interesting way is one of the author's gifts and explains in part the merited success of this book. Those who have used it know its many excellencies. "The alterations in the new edition relate to glands of internal secretion, to the lymphatic system, to the anatomy of the abdomen, and to new facts which have been discovered by the use of X-rays in examining the human body," but in size and form and color this old favorite remains unchanged.

International Clinics. Vol. III. 21 Series. $2.00. (*Philadelphia and London: J. B. Lippincott Company, 1911.*)

The usual variety of clinical articles on various diseases and conditions with certain general papers dealing with the broader aspects of the practice of medicine are to be found in this volume. The distinctive quality of the "International Clinics" is the method of handling the subjects under consideration—each writer treats his problem from a practical standpoint, and it is this feature which has helped to make the series so popular, as well as the excellent selection of authors and topics.

Handbook of Suggestive Therapeutics, Applied Hypnotism, Psychic Science. A Manual of Practical Psychotherapy, Designed Especially for the General Practitioner of Medicine and Surgery. By Henry S. Munro, M. D. Third Edition. Revised and Enlarged. $4.00. (*St. Louis: C. V. Mosby Company, 1911.*)

Any medical book which has achieved a third edition must have filled a want and be deservedly popular. The author has very successfully stated facts in a simple way, which are ordinarily couched in technical language, and has added many illustrative cases to render things still more clear. He deserves great credit for his work and we believe that every practitioner, who is not already familiar with the cardinal principles of psychotherapy, will gain much by a perusal of this work. Sound common sense is the keynote of the whole work. W. R. D.

Fiske Fund Prize Dissertation. Vaccine-Therapy. By WILLIAM C. DWINELL, M. D. (*Providence: Snow & Farnham Company, 1911.*)

The author, who is an advocate of this method of treatment for a variety of diseases, has written a brief but clear review of the status of vaccine-therapy to-day. It will be useful to the general practitioner by giving him an idea of what can be done with vaccine. Their value is still *sub judice*, but there is little doubt that they are efficient in some instances.

Refraction and Visual Acuity. By KENNETH SCOTT, M. D., etc. Illustrated. $1.75. (*New York: Rebman Company, 1911.*)

This book will serve to impress on the reader the fundamental points to which his attention will be called in the early days of his practical work in the eye clinic; but as the subjects are covered in a very superficial way the real value of the book is small. Its importance to American readers is still further lessened, as in our clinics the plane mirror is mostly used in skiascopy and a different position on the trial frame of the degrees is in vogue. Considerable space is given to the insertion of special tables of the visual requirements of the various services and railroads. As one interested depends only on the very latest printed and authorized instructions, which are subject to modifications and changes at any time, it would seem that the insertion of these tables was superfluous. Instead, one model table would better serve the needs of the general reader. This book at its best gives only a superficial description of elementary optical principals, found for the most part in the ordinary text-books on the eye, and hence its field for usefulness is limited. The topography of the book is not especially pleasing to the eye, and the author is not as careful in his choice of words as should be reasonably expected from him, in a book of this class.

B. B. B., Jr.

Manual of the Diseases of the Eye for Students and General Practitioners. By CHARLES H. MAY, M. D., etc. Seventh Edition. Revised. Illustrated. $2.00. (*New York: William Wood and Company, 1911.*)

We are glad to see another edition of May's unpretentious, yet so thoroughly satisfactory text-book on the eye. The subject matter is thoroughly modern, well balanced, and skilfully arranged. The author gets right to the point of a description of the diseases and their treatment, and but little space is given to theoretical, and controversial matters, which is in part responsible for its popularity with medical students, who can, necessarily, devote but a short space of time to the subject of eye diseases. Again, the fact that it has now appeared in six foreign languages is more than sufficient commendation for its merits. A thoroughly satisfactory index still further enhances its real worth.

If more text-book makers would examine "May" carefully before putting their own productions on the market, we should not have occasion to so often call attention to the uselessness of most of the small books on the eye, which appear from time to time, and which fall far short in merit to this excellent text-book.

B. B. B., Jr.

An International System of Opthalmic Practice. Edited by WALTER L. PYLE, M. D. *Pathology and Bacteriology.* By E. TREACHER COLLINS, F. R. C. S., and M. STEPHEN MAYOU, F. R. C. S. Illustrated. $4.00. (*Philadelphia: P. Blakiston's Son & Co., 1911.*)

Numerous articles describing the pathological changes, occurring in diseased or mal-formed eyes, especially the microscopical appearances noted, have appeared in various journals in the past few years, but these detailed descriptions are usually not given in the ordinary text-book on eye diseases, and the present book supplies a need in a satisfactory manner. While one acquainted with pathology can usually visualize just what the changes would be, yet the specific description of actual cases is more positive and convincing and this book is full of such material. It is descriptive in character, and not much attention is given to the causes that have inaugurated the pathological changes; and had more of the experimental work, which has been done in connection with animals' eyes been included, it would have been considerably more interesting and stimulating. It, however, limits itself more especially to the pathological findings in actual clinical cases.

Little attention has been given by the authors to the consideration of such problems as the passage of fluids to the interior of the eye, or to the still obscure subjects of sympathetic ophthalmitis and the etiology of cataracts. On the whole, the authors give a very correct account of the clinical and microscopical pathology of the diseases of the eye, and the work can be commended to the general reader, but it certainly cannot be considered, in its present form, as a book giving an exhaustive account, or the final word on the pathological problems pertaining to the eye. The most satisfactory reading matter is found in connection with the material devoted to the diseases of the uveal tract.

B. B. B., Jr.

Lippincott's New Medical Dictionary. Edited by HENRY W. CATTELL, M. D. Illustrated. Second Edition. $5.00. (*Philadelphia and London: J. B. Lippincott Company, 1911.*)

The first edition of this work appeared only a little over a year ago; that a new enlarged edition should be called for within so short a time is itself proof of the success of this dictionary, gratifying evidence that the profession have appreciated its merits. Medicine is such a broad subject—including so many sciences, such as chemistry, physics, biology, etc., which formerly had but slight connection with it—that a medical dictionary must include many words which seem to have but a distant connection with medicine, and there is a danger that medical dictionaries will lose their character and be overburdened by the new words which are constantly being added to the allied sciences. It is difficult to know where to draw the line, for many persons are not able to buy more than one or possibly two dictionaries, and so for them the larger and more comprehensive works are, within certain limits, the best; but there seems to be a growing tendency to include chemical terms in large numbers and this we believe to be a distinct mistake.

Another error we believe exists in defining all possible words with a common prefix, like "pseudo," "hyper" and "poly"—an intelligent person does not need such help and dictionaries might be shortened by the omission of many words with this and similar prefixes. There are many other needless definitions; take, for example, but one that we chanced upon in this dictionary—"cordate—shaped like a heart." Then follows immediately "C . . leaf —a heart-shaped leaf." This seems absolutely unnecessary; what else could it be? Other apparently needless definitions are to be found under the word "dilatation." If erroneous spelling of words are admitted there can be no limit to the size of a dictionary, example "Paramœcium, an erroneous spelling of "Paramecium." Could not such a list be added to indefinitely?

Illustrations in this, as in all illustrated medical dictionaries, have little to be said for them—they are invariably, one may say, poor, and there seems to be no system used in their selection. But it is not intended to pick flaws in this dictionary; it is an excellent one and to be heartily endorsed. Others also exist which can be warmly praised, some larger and some smaller, so that when it comes to selecting "one" the choice is difficult, but none will go astray who purchases Dr. Cattell's by preference.

Food Values Practical Tables for Use in Private Practice and Public Institutions. By Edwin A. Locke, M. D. $1.25. (*New York and London: D. Appleton and Company, 1911.*)

This is an excellent manual not only for students of medicine, but for practitioners and nurses. To the latter it ought to be invaluable. Dr. Locke deserves much praise for the admirable way in which he has arranged his tables, and his introduction, brief as it is, is clear and wise. He is not a faddist like so many experts on nutrition and diets. He presents some of the general principles of dietetics in an easily comprehensible manner in his introduction and after reading this the use of the tables is made easy for any intelligent person. The success of this work is assured for there is no other of the kind which is so practicable and so well prepared.

Pathological Technic. Including Directions for the Performance of Autopsies and for Clinical Diagnosis by Laboratory Methods. By F. B. Mallory, M. D., Associate Professor of Pathology, Harvard Medical School; and J. H. Wright, M. D., Director of the Pathological Laboratory, Massachusetts General Hospital. Fifth Revised Edition. Illustrated. 1911. $3.00.

Dorland's American Illustrated Medical Dictionary. Sixth Revised Edition. 1911. $4.50.

The Treatment of Fractures: With Notes upon a Few Common Dislocations. By Chas. L. Scudder, M. D., Surgeon to the Massachusetts General Hospital. Seventh Edition. Revised and Enlarged. Illustrated. 1911. $6.00.

A Text-book of the Practice of Medicine. By James M. Anders, M. D., Ph. D., LL. D., Professor of the Theory and Practice of Medicine and of Clinical Medicine, Medico-Chirurgical College, Philadelphia. Tenth Revised Edition. $5.50.

A Text-Book of Physiology: for Medical Students and Physicians. By William H. Howell, Ph. D., M. D., Professor of Physiology, Johns Hopkins University, Baltimore. Fourth Edition. Revised. 1911. Cloth, $4.00. (*Philadelphia and London: W. B. Saunders Company, 1911.*)

It is a pleasure to call attention to these five notable works, all appearing in new editions. Their success testifies to their merits, and is an indication that they have well met the demands of the profession.

The clearness, simplicity and practicality of Wright and Mallory's Pathological Technic makes it an eminently useful book to the student; there is no other book in English which covers the ground so satisfactorily.

In view of the fact that there are several other medical dictionaries—Gould's, Stedman's and Cattell's—which have their distinctions and admirers, the demand for a sixth edition of Dorland's is a sure proof that its excellencies have appealed to many doctors.

Scudder's work, admirably illustrated by X-ray and other photographs, is a classic and has been so often warmly commended that it demands no further praise.

The favorable reception of Anders' Text-Book of Medicine is noteworthy; it has been carefully revised, and new material has been added, so that the new edition will be welcomed by many.

There is no question that Howell's Text-Book of Physiology is the best in the English language, and the appearance of the fourth edition shows that its value is being more and more generally recognized by teachers and students. Since its first appearance the importance of the work has grown, and as a text-book, its merits are of the highest order.

The publishers are to be complimented on the handsome appearance of these books, and also on their activity in republishing these standard medical works.

Collected Papers by the Staff of St. Mary's Hospital (Mayo Clinic) 1910. Illustrated. $5.50 (*Philadelphia and London: W. B. Saunders Company, 1191.*)

It is but a short time ago that the first volume of papers from this staff appeared, and in this second handsomely printed volume there are a series of important articles on The Alimentary Canal, Hernia, Genito-Urinary Organs, Ductless Glands, Head, Neck, and Extremities, Technic, and General Papers. As the product of a purely surgical hospital, this a remarkable collection, and all surgeons will be anxious to own in collected form the papers by the Mayo Brothers, as they are commonly called, and their pupils and assistants.

The Practice of Medicine. By Frederic Taylor, M. D., F. R. C. P., Consulting Physician to Guy's Hospital, London. (*New York: The Macmillan Company, 1911.*)

This is one of the popular British text-books of medicine and the present is the ninth edition. The author has partially disarmed criticism of his arrangement by expecting it in his preface. We should not agree with him in placing pneumonia among the diseases of the respiratory system. He does not place typhoid fever under the digestive tract. Attention is at once drawn to the inclusion of a section on diseases of the skin. Perhaps it is an advantage for the student but on the whole we doubt the wisdom of this. The descriptions of skin diseases have to be brief and the space might better be used to allow fuller descriptions of disease generally. However, this is a matter of opinion. A satisfactory feature is a general preliminary section of each system before the special diseases are considered. In these there is some reference to diagnostic methods which is necessarily brief but much is compressed into them. For example, the main points in the physical examination of the chest are well summarized in a few pages. There are some points in terminology which deserve comment. The author uses the adjective *tubercular* to designate conditions due to the tubercle bacillus but it seems preferable (as suggested by Macalister) to use *tuberculous* for this and employ tubercular to designate morphological changes characteristic of anatomical tubercle. Thus we might speak of tubercular syphilides, tubercular leprosy, etc. The use of "phthisis" for pulmonary tuberculosis seems a step backward as no universal meaning is attached to the term. It has as many meanings as pronunciations. The relative space given to hysteria, neurasthenia and hypochondriasis is unusual. Hysteria has about ten pages—and an excellent section it is—neurasthenia less than one page and hypochondriasis a little over one. For American readers it is a surprise to find so little attention given to neurasthenia (once called the English Malady) and so relatively much to hypochondriasis. We question if many would agree with the author in the conditions which he considers under hypochondriasis. The discussion of the treatment of these disorders takes little notice of the newer psychical methods.

However, these are minor points and the work as a whole is well worthy of high commendation. There is an excellent division of space among the subjects with reference to their relative importance. The descriptions throughout are clear and reference to recent work has shown that the author has brought this edition up to date. One omission is the lack of any reference in the section on pellagra to its occurrence in the United States. Altogether it is recommended as an excellent work and a satisfactory text-book of medicine.

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